

MEMORY IN HYPNOTIC AGE REGRESSION

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I. INTRODUCTION

Since the beginning of man's thought about knowledge, the secrets of memory, which nature so reluctantly gives up, have been pursued by philosophers, scientists, poets, artists, by all who wished to understand the world of living creatures.

The Greeks, characterized by a passion to penetrate the ultimate nature of things, considered Mnemosyne the mother of all nine Muses. Thus, they symbolized in their mythology their intuitive understanding that the creative arts owed their existence in part to man's capacity for memory.

The fact that an event at a specific point in time exercises its influence on an event at a subsequent point in time, or is revived in some form in a subsequent point in time, seems so obvious, yet is so profound a riddle of human life.

Because the bridging of time is one of the essential characteristics of what is called memory, the initial studies of memory consisted of committing certain material to memory; and after a period of time, attempting to determine how much of this material could be brought forth again. The amount of material repeated after a lapse in time was considered to be the amount of material learned or remembered. For a long time learning and memory were synonymous.

The study of memory first took on scientific stature with Ebbinghaus' (1885) studies of the learning of nonsense material.

Since then the study of learning has become one of the cornerstones of experimental psychology. Today theories of learning (Hilgard, 1948) form the basis of many schools of psychology. Modern psychologists, however, draw a finer distinction between learning and memory. Learning still properly belongs within the more general area of memory, but, as we shall see, the substance of memory amounts to more than the mere learning of material and its retention.

The time elapsing between events and their recall is the sine qua non of the phenomenon of memory. This temporal span offers the greatest challenge to the experimenter. It presents many methodological difficulties. Sometimes one has to wait but a minute, and other times twenty years to see what happens to the memory of an event. Although occasionally experimenters such as Ebbinghaus (1885) and Bartlett (1932) have done the latter, not many are willing or able to wait that long. To reverse the process of time and to recapture the past is a dream of man; and, indeed, in dreams this wish is often fulfilled. Scientific experimentation may begin with dreams but must end with actual knowledge.

Early experimental studies of memory have been for the most part based on the presupposition that the quality of the memory function depends upon the increase or decrease in a quantitative capacity. People were considered to have "good" memory or "bad" memory, i. e., they were thought to have the capacity to learn much or little. Memory was generally considered to be a function with which one is endowed as one is with intelligence. It was thought that both improve

with age up to a certain point and then level off; and that they have a growth curve that follows the normal growth curves of other functions of the human organism. While it has been generally recognized that the contents of a child's memory and that of an adult's are different, it was assumed that the function of memory in a child, an adult, and in the aged differed mainly in their quantitative aspects (e.g., Thorndyke, 1928). Later experimentation led to evidence that this was not entirely so. Jaensch (1930) has shown that what children retain through eidetic imagery differs from the memory of adults; and that in the adult this capacity tends to decline or become lost.

Werner (1940) emphasized the greater ability of children to retain physiognomic features of their perceptual experience, which ability he compared with the acute sensuous memory of primitive man who shows a striking likeness to eidetic children in his amazing ability to remember natural forms and localities. In summarizing Piaget's and Werner's work, Scheerer, Rothmann, and Goldstein (1945) pointed out,

In its initial stages memory seems to hinge on the child's responsiveness to concrete situations and action contexts as well as on his greater impressionability with the palpable sense of material, such as perceptual qualities, of shape, color, sound, rhythm. Here the marked sensitivity to concrete grouping and readiness for acoustico-motor and kinesthetic pattern is a determining factor, especially in spontaneous retention. (p. 56)

The experiments by Brunswick et al., (1920) demonstrated that retention differs for different modalities according to different stages of development. For example, children at one stage recalled motor tasks better than children at a later stage who exceeded the former in conceptual memory.

Those investigators who have concerned themselves with a genetic and developmental approach to memory have found that the quality of the memory function is not simply a matter of the development of quantitative capacity. The memory function appears to go through a natural history of ontogenetic development just as other physical and psychological functions do. If we are to understand memory, we ought to know more about its developmental aspects.

Scheerer (1953) pointed out that,

. . . if we want to assess the role of learning for personality formation, we have first to determine the cognitive field of the child for each developmental stage. It is the developmental stage which determines the characteristics of the cognitive structuring in the child's life space. Consequently, any learning theory applied to personality development becomes dependent on a genetic theory of cognition. (p. 6)

As Scheerer noted, if children's causal thinking differs at certain stages from that of adults, then phenomenal causality must differ; and, therefore, the experience of personal causality will be different, for example, objects may still be imbued with personal causation.

It is our view that at any stage of development, an event will be experienced according to the developmental stage of the cognitive and emotional structure of the personality. The memory of an event is embedded in the way of experiencing it at the time of its occurrence. This embeddedness has two aspects. There is first the contemporary environmental context of an event which contributes to the forming of the impression that is experienced and retained. Second, this impression is contextually within the experiential mode or functioning of the personality at that time.

The adult personality no longer perceives a cat and a dog as alike. Such an experience of phenomenal similarity appears lost to the adult not only as an experiential possibility, but what is even more interesting and significant is that this experience is lost as a memory as well. Here is a fact of tremendous importance. Adults remember practically nothing about the way they experienced or functioned as children. Of all the important things that have happened to adults, the developmental stages and the changes in their capacities and mental processes seem to be the least remembered.

In the past, the study of memory traces has almost entirely concerned itself with memory of events, i.e., the memory of the person's interaction with his environment. But psychology may profit much from investigating the memory of the individual's past functioning and mode of experiencing. In psychopathology and psychotherapy, for example, it has long been recognized as important to bring to awareness how the person experienced himself as well as others in the past. And the memory he has of himself and his past functioning are major factors in the psychotherapeutic process.

This poses two problems. Can we revive earlier experiential modes and functioning which adults have developmentally outgrown? Are such trace systems obliterated or only unavailable? Further, can we revive memory traces of an event which have been embedded in such earlier functional contexts? Are these traces obliterated or also just unavailable?

With regard to the first problem, Scheerer (1953) asked, Are these stages of individual development generally left behind without any trace? Or, do certain of their characteristics become trace systems and organize into levels

of potential functioning in the formed personality? Can, for example, certain syncretic modes of thought, adaptive magical meanings, or sentiments of personal realism which have been operative at an earlier stage become reactivated as lower order levels of cognitive structuring under future stressful conditions. (p.9)

The difficulty of investigating these problems lies in the fact that the reactivation of past experiences in their original form is interfered with by the influence of later developmental organization and experiences as well as by the tendency to restructure the past in the light of the present.

If there were some method of isolating a given stage in development of a personality from its later development, we might be able to study the cognitive and emotional structure of this earlier level without the interfering influence of later experience. There seems to be a possibility of achieving something close to this by such a technique as hypnotic age regression.

Since perceiving, thinking, and feeling go through a developmental history and change, we might be able to study earlier forms of cognitive and emotional structuring through this method. And since the memory of a specific event is embedded in the context of past perception, feeling, and thinking, i.e., contextually tied to such earlier structuring, hypnotic age regression may lead to revivification or reactivation of such events.

A. Background of the Problem

Contemporary psychological theory no longer considers memory as a process akin to imprinting experiences on a wax plate which became available in a mechanistic way whenever the proper associations led to it.

Early experimentalists such as Ebbinghaus (1885) sought to investigate memory in its "pure" form by isolating it from the functioning of the rest of the organism. But in contemporary research, psychologists have come to recognize the need for studying memory as part of and in relation to other aspects of the total functioning of the personality.

That the context within which an event is embedded may influence the memory of that event has been noted by many investigators. But this term "context" has been used with several meanings, which have not always been separated. At times it has referred to the environmental context, at other times to the psychological context within the experiencing person, and still at other times to both.

McGeoch (1939) defined context as follows:

One kind of context consists of the stimulation from the external environment, such as, the furniture of the room, the experimenter, and the apparatus. The second kind is the stimulation from the interoceptors which make up the feeling of the body, and a third is the ideational context which constitutes the unessential content of consciousness. (p. 347)

In the main, those investigators who spoke directly of "context" had reference to the environmental context or background of the past event. All agreed that the environmental context exerted an effect on the memory process.

Dulsky (1935) used paired nonsense lists, ten pairs to a list. Background was varied by putting the words on different colored papers and then changing the colors at the time of recall. Many different colors were used during the learning and many changes were made during recall. Under conditions of no change 365 responses were correct in recall, whereas under conditions of change only 265 responses were

correct in recall. In addition, when the lists were relearned after five minutes, it required almost three times as many trials with changed background as with the same background.

Similarly, Pan (1926) tested the dependence of recall upon the environmental background in which the material is presented. His subjects were required to memorize pairs of words presented in various background situations. (For example, paired associates were presented with small letters under them. Later one member of the pair was presented for recall with a different small letter under it. He also had the subject learn the names of human faces which were presented on a certain background, such as a landscape. Later the faces were presented with a different background and the subject had to recall the names.) The subjects were later tested for their ability to recall the material when the contextual situation was present, absent, or altered in certain specified ways. Pan (1926) concluded that the recall of any material is aided by the presence of an environmental factor which has some associative connection with the material.

Using the savings method, Smith and Guthrie (1921) varied the environmental conditions during relearning. They found that in eight out of ten subjects there was greater saving when relearning took place in the same surroundings in which the original learning had occurred.

Early Gestalt psychologists often spoke of context in relation to memory and perception. While they spoke of context within a total field which would include both environment and the experiencing person, most of their experimental work was concentrated on the environmental context.

Wertheimer (1950) said,

Memory, too is concerned primarily with the whole-property and structural unity of the thing remembered. Memory processes and experience do not consist in a bare sequence of events, each essentially alien to all the rest. Contextual indifference in association or habit ('mechanical') memory in general is simply a limiting case. (p. 16)

Kohler (1947) pointed out that,

. . . not only the organization given at the time of the association matters, but, also, the organization at the time of (expected) recall. When given again in a certain environment, a pattern of stimuli may constitute an excellent basis for recall. However, a pattern will not often be repeated in precisely the environment in which it occurred when the association was formed. Now, quite apart from the cruder obstacles which have been considered above, even a slight change of the surrounding field may make a given pattern unable to cause recall of associated items, simply because the change introduces a new organization in which the experiences corresponding to that pattern are no longer present. (p. 291)

It is quite clear that both authors are referring to changes in the stimulus pattern which produces changes in the experience of the person. Of course, this is true. But the psychological context includes not only the stimulus pattern, but the experiencing person himself, for it is often true that changes in the experiencing person often bring about changes in the way he sees the same stimulus.

Lewin (1936) attempted to bring the environmental context and the experiential context together by postulating a psychological field in which the environment was defined as the psychological environment as perceived by the psychological person.

Scheerer (1953) stressed the importance of the cognitive structure as a context in remembering. He said, "What is retained may belong marginally to the context of the situation and later become cognitively available when a similar context or 'sphere of meaning' returns." (p. 13)

In speaking of a "sphere of meaning," he was obviously taking into consideration the environmental stimuli as experienced by the person.

Rappaport (1942) held that memory was but one aspect of the organization of thought processes. He felt that memory must be viewed within the context of the unique organization of each personality's thought processes. The fact that changes in the experiencing person may change the way he perceives or remembers the same stimulus is receiving considerable attention today in the personality and perception work of Klein (1951) and the writings on cognitive structure by Scheerer (1953). Other investigators have emphasized the experiential context of retention with regard to such specific inner conditions of the person, as attitudes, interests, intentions, etc.

Crosland (1921), one of the first to make a qualitative analysis of memory, claimed that what is remembered is embedded in a general "attitude complex." This attitude complex consists mainly of kinaesthetic organic and affective components and is very stable.

Pear (1922) attributed a determining role to "sentiments" in normal remembering and forgetting. A "sentiment" is an organized system of emotional tendencies.

Thus, alternatives to the traditional associationistic theories emphasized the active, selective role rather than the passive receptivity of human personality in its functioning. Perception is considered as an active reception of stimuli from the environment during which process selective dynamic factors are introduced. There appears to be considerable agreement that memory processes are subject to the selective influence of the personality factors at the time of the

experiencing, and when remembering the experience takes place, and in the period in between, the retention period.

Many experimenters have studied the dynamic forces of personality which influence memory. Some studies have focused on attitudes and some on interests; others have emphasized the intellectual rather than the emotional aspects; some have recognized the importance of context; but most are agreed that memory traces are constantly subjected to dynamic processes of personality organization.

Bartlett (1932), Pear (1922), Stern (1938), McDougall (1923), and Gordon (1937) all maintained that memory is selective and that the selectivity is traceable to either sentiment, interest, need, attitude, or set.

Ach (1905) introduced the concept of "determining tendency" to explain the selectivity in psychic function.

Lewin (1926) and his followers such as Zeigarnik (1935) and Birenbaum (1930) stressed the influence of "intention" upon memory. They considered "intentions" as quasi-needs. These quasi-needs set up tension systems which motivate the person to remember. They found that facts pertaining to undischarged tension systems are remembered better than those pertaining to discharged tension systems. Tension systems do not always make for better remembering. Those to which the experience of failure becomes attached are frequently "isolated" from the rest of the field.

Freud's (1938) hypothesis about the regulating role of the pleasure-pain principle in repression (and thus forgetting) introduced a new kind of memory experiment. Innumerable experiments were conducted to determine whether pleasant or unpleasant material

facilitated remembering or forgetting. Rappaport (1942) has summarized a wide variety of experiments concerning the effect of pleasant and unpleasant material on learning and forgetting. He concluded that though experimenters claimed to have proved or disproved the Freudian theory of repression, purely on the basis of statistical results, only Sharp (1938) and Diven (1937) reported phenomena resembling the Freudian mechanism.

1. Memory traces. Some kind of trace theory or "engram" is a useful hypothetical construct in elaborating theories of memory. For some psychologists, however, this has been more than a construct. For Koffka and Kohler, memory trace is not just a construct, but exists as a property of the isomorphic processes of the brain field.

Whether in the form of traces or engrams, what is important is that past experiences are available to the present person. Early psychologists supposed that memories were available unchanged and that what was remembered was a "true" picture of the original event.

The Gestalt psychologists brought to psychology the laws of organization of perception. These laws of organization apply to learning as well as to memory. To account for memory, Kohler (1940) and Koffka (1935) formulated a trace theory. Essentially the theory postulated that experienced events may leave a physiological memory trace which persists and represents the past in the present. The trace systems are organized according to Gestalt laws of whole-part organization. The current process may communicate with the trace system and the Ego can select and reactivate it. Successful communication results in a new process of recall or recognition.

Bartlett's (1932) classical study on remembering was one of the first studies of the dynamic function of memory. It was his view that remembering is not a mechanical revival of engrams, but an active process of reconstruction. He said,

Remembering is not the reexcitation of innumerable, fixed, lifeless, and fragmentary traces. It is an imaginative reconstruction or construction built out of the relation of our attitude toward the whole active mass of organized past reactions or experience, and to a little outstanding detail which commonly appears in image or in language form. It is thus hardly ever really exact, even in the most rudimentary cases of rote recapitulation; and it is not at all important that it should be so. (p. 213)

The appearance of Bartlett's qualitative work on memory and the influence of modern psychology, particularly the Gestalt school gave impetus to the view that dynamic processes go to work on memory and the original form of the trace is changed.

Wulf (1922), investigating the changes that take place in memory, found that his subjects had a tendency to sharpen or minimize certain aspects of the original percept. He wrote:

Just as it is true that not every figure may be perceived in any arbitrary way one pleases, so also, not everything that is perceived will be retained in memory. That which remains in memory -- the psychological 'engram' -- cannot therefore be thought of as an unalterable impression -- a drawing scratched on stone -- whose only modification with the passage of time is to fade and blur. Instead, the engram undergoes changes in accordance with Gestalt laws. In place of the originally perceived figure there occur, with time, deviations from this original and these changes are modifications of the figure as a whole. We have seen that there are two mutually opposed lines of directional change: levelling and sharpening. (p. 147)

On the other hand, Hebb and Foord (1945) claimed that there was no evidence to even faintly support the idea of slow, spontaneous changes in the trace. Freud (1949 a), however, has pointed out the process of "reconstruction" of memories which takes place with

patients in psychotherapy. There is much clinical evidence to show that memory of early events changes depending upon the present ego structure of the person at the time of remembering.

But psychopathology also produced clinical evidences of early memories which appeared to preserve some of their original features and impact; and which continued to exert an influence on the thoughts and feelings of the individual throughout his life.

The work on hysteria by Janet (1901), and Freud and Breuer (1949b) emphasized the impact of early traumatic events on later psychological abnormalities. Many symptom formations and abnormalities were explained on the basis of an unconscious memory of a traumatic event exercising its original impact on the individual in spite of the fact that he was unaware of it doing so. Working with hypnosis, they found it was possible in the hypnotic trance to recover memories that had long been lost to consciousness and which no amount of conscious effort could bring back.

2. Memory in hypnosis. The clinical reports of dramatic recovery of lost memory in hypnosis encouraged some experimenters to use hypnosis to study the memory function. One of the earliest investigators of hypermnnesia under hypnosis was Morton Prince (1916). He reported that his subjects' memory was improved under hypnosis, but his experiments were primitive and poorly controlled. Huse (1930) investigated this phenomena with the traditional nonsense syllable learning experiment. Though her data showed slightly more recall in the normal state than in the hypnotic trance, there was no statistical difference.

Stalnaker and Riddles (1932) clearly established hypermnesia in the trance state for meaningful material learned a year or more before. They felt that the specific suggestion for improved recall in the trance state might be responsible for the difference in memory between the hypnotic trance state and the waking state.

Young (1925) found no noticeable differences between normal and hypnotic states in the field of sensation, perception, fine discrimination, present memory (learning and retention), or physical work which did not involve fatigue. However, he did find that, in some persons, memory for long past events was much better in hypnosis than in the waking state.

White, Fox, and Harris (1940) tested for hypnotic hypermnesia of three types of recently learned material. They found that hypnosis conferred no benefits on the recall of paired nonsense associates learned the day before; but it created substantial hypermnesia for meaningful poetry; and there was some evidence for a similar gain in the case of moving picture scenes without captions or plot.

Rosenthal (1944) found that previously learned meaningful, connected material showed hypnotic hypermnesia. On the other hand, single, innocuous words, not in an organized or meaningful context failed to show hypnotic hypermnesia.

One of the most interesting and controversial phenomena of memory in hypnosis is that in which the subject apparently behaviorally "regresses" back to an earlier age level, and appears to exhibit some behavior patterns consistent with that particular age. Anyone who has seen a case of hypnotic age regression cannot but be impressed with the realism with which some subjects appear to accept and to be functioning at an earlier age level.

Whether the subject is actually regressed to a previous age or is acting out an adult conception of what he was like at that earlier age is the core of a controversy.

That a definite organic reproduction of an earlier developmental period was possible in hypnosis was demonstrated in a number of studies of physiological changes. Gidro-Frank and Bowerbuch (1948) produced a positive Babinski sign in three subjects regressed to the age of less than six months. The subjects, who were not aware of the nature of the experiment, showed dorsiflexion of the great toe when the hypnotic age level was less than six months. The authors did not bring this change about by direct suggestion, nor was it produced by the hypnotic state itself. A month by month hypnotic regression showed the alteration of the response from plantar flexion to dorsiflexion at the regressed age of six months. Reversal of the response to its adult form appeared at the same age in progression. True and Stephenson (1951) reported similar results in five out of six subjects regressed to the age of one month. Moody (1946) reported that rope weals which had been inflicted ten years before appeared during abreaction under drug-induced narcosis in a thirty-five year old woman. He also reported that localized ischaemia of the extremities appeared during abreaction in a merchant seaman who had suffered a long period of immersion in cold water.

In addition to organic reproductions of earlier stages, many investigators reported corresponding intellectual and emotional changes.

Kline and Haggerty (1953) studied the difference between the responses to the Thematic Apperception Test of one subject who simulated and then was hypnotically regressed. They found that in simulation

the orientation was still decidedly adult with an attempt to structure the response pattern on a childlike basis. Statistically and qualitatively, the simulator's attempt failed to meet the standard of an actual earlier age level recapitulation or revivification. The hypnotic regression series was markedly different for the experimental subject. It contained an incorporation of associations, life experiences, and influences as they appeared at the time. They concluded that in the hypnotic series, the perceptual mechanism appeared to be altered and that this alteration brought into activity the associations, affects, and projections that had existed at the regressed age level.

Kline (1950) administered The Otis Intelligence Test at several hypnotically regressed age levels to an experimental population of ten male college students. For all subjects there was a significant loss in raw score which coincided with the age to which they had been regressed. I.Q. remained constant. From the regressed age of eight years to the waking age of twenty-two years, the test scores reflected a picture of mental maturation characterized by an increasing achievement. From this study it appeared that hypnotic age regression involved much more than recall and simulation acuity. With specific reference to intelligence, hypnotic regression seemed to involve the entire person. The author commented that while further work is still needed to clarify the nature of regression phenomena, it appeared that this method of investigating developmental factors involving behavior was a valid one.

Ginden (1951) reported an experiment with a subject whom he regressed back to the age of six. He had the subject write his name

on a blackboard and then in a notebook. Later the experimenter was able to compare this signature with his actual writing in a notebook provided by the subject's mother. He concluded that the names were alike in every detail.

True (1949) using a mixed group group of forty men and ten women, all of whom were capable of deep trance, regressed his subjects to ages ten, seven, and four. He used Christmas and their birthdays as chronological landmarks in the particular year involved. On such dates they were asked, "What day is this?" and their answers were scored against a two hundred year calendar. Ninety-three per cent were correct at the age level of ten, 82 per cent at age seven, and 69 per cent at age four. One is inclined to question the meaning of his finding that 69 per cent of those regressed to age four can name the day of the week their birthday or Christmas fell on. It seems unlikely that four year olds are cognizant of the days of the week.

Mercer and Gibson (1950) administered the Stanford Binet vocabulary, the Goodenough drawing, and the Rorschach on three successive days to one subject regressed to ten, six, and fourteen years of age, respectively. In the waking state, the Rorschach was given in the usual fashion. The authors concluded that the test data reflected the changes at the various regressed age levels which were consistent with productions characteristic of the person at that time. The data also followed the clinical findings so clearly that true regression was not doubted. It was their view that regardless of whether one believes that the regression represents a genuine reproduction of an earlier period of life, or simply represents an adult acting out of an earlier period of life; there could be little doubt that the

Rorschach responses given at the various induced ages indicated deep-rooted personality disturbances related to sex, death, family relationships, and early religious training.

Bergman, Graham, and Leavitt (1947) were impressed with the apparent genuineness with which certain hypnotized subjects can be regressed to infantile modes of behavior. In this regression more than mere remembering is involved, for the hypnotized subject behaves as though he has actually resumed living an earlier part of his life. They gave a series of Rorschach tests to an individual who was hypnotically regressed to consecutive chronological age levels. The results of this study suggest that Rorschach sampling at various age levels of hypnotically regressed subjects may locate periods of increased psychic stress or morbid personality changes. The authors concluded that the Rorschach administered to hypnotically regressed individuals appeared to factually reflect various stages of personality development. The study suggests that the human organism has a capacity to store up successful layers of experience in such a way that earlier levels do not lose their vitality.

Hadfield (1928) commented on the extraordinary tone with which experiences were relived, forgotten details vividly recalled, and much original affect associated with significant experiences is recovered in hypnotic age regression.

While most hypnotic age regression experimenters have concerned themselves with some standardized test or projective technique, Kline (1953) has been one of the few investigators who has concerned himself with experimentally induced emotions in subjects under hypnotic age regression. He selected from Jersild's (1935) studies of children's

fears, four experimental situations. He placed a twenty-five year old female subject in hypnotic age regression at the level of three years. He exposed his subject to four fear producing situations in a manner similar to that described by Jersild. These were: being left alone, entering a dark room, contact with a strange person, and seeing a snake. Of the four fear situations, three produced fear in the hypnotic regression state. No fear was expressed in the waking or chronological hypnotic state. The subject's emotional reaction of fear assumed a pattern similar to that of a child at that age. The spontaneity and the intensity of the reaction of fear involved in these experimental instances, including in one case involuntary urination, appeared clinically to be beyond simulation.

Not all investigators, however, report positive results with hypnotic age regression.

Young (1940) used fourteen trance subjects and seven unhypnotizable control subjects in a series of individual Stanford-Binet Intelligence Tests and arrived at the following conclusions: When trance subjects were ordered to regress to their third birthday, they tested on the average as children who were six years old would test. Unhypnotized control subjects had better success approximating a three year level of performance when they simulated that age, than did the trance subjects who asserted they were back at that age.

Young said,

Whether the inability of the trance subject to regress beyond the fifth or sixth year even when ordered back to their third birthday is due to the fact that the personality takes form about that time; or to the fact that the trance subjects, unlike control subjects, were unwittingly playing a role and playing less skillfully than the controls by virtue of having voluntarily sur-

rendered their critical attitudes during the trance is a question not solved by this experimentation. On the basis of this and other experimentation, however, the writer would hazard the guess that role playing would more likely explain the phenomena. Hypnosis is playing the role with all one's heart but not with all one's mind. (p.278)

A careful reading of Young's (1940) experiment gives on the impression that the results he obtained may very likely have been the result of poor induction techniques. The subjects were told,

You are now three years old. Do you understand? You are now three years old. It is your birthday. You are now three years old. You will be three years old until I wake you up. How old are you? (p. 275)

No suggestion was made to the subjects to think, act, and feel like a three year old. The simple statement of the fact that the subject is now three years old might not have been enough to induce a true hypnotic regression. Erickson and Kubie (1941) have emphasized the necessity of using the proper technique for inducing regression. They attributed the failure of many experimenters to get positive results in regression experiments to poor or faulty induction technique. They have also called attention to the necessity of giving the subject time to reorient himself in the regressed state. These short instructions do not appear to do so.

If the trance is deep enough, and regression is properly induced, and the subject given proper time to reorient himself, experimenters have found that a fairly extensive functional regression is possible. Young contended that the simulators were better than the hypnotized subjects because the hypnotized subjects had surrendered their critical attitudes during the trance. The assumption that hypnotic age regression in a trance requires the critical faculty of the adult in order to be able to functionally perform at a regressed

level is certainly not justified on the basis of Young's or other experimenter's findings. The evidence seems to point more clearly in the direction that a suspension of the adult's critical faculties facilitates age regression in hypnosis.

Orne (1951) used ten university students ranging from ages seven-teen to twenty-six for an experimental evaluation of hypnotic age regression. In the somnambulistic state of hypnosis, the age of six was suggested and Rorschach records, and drawings, and handwriting samples were taken. In the waking state, the same tasks were used with the subjects. Genuine childhood drawings done at the age of six by one subject and a Rorschach test given at that age to another subject were available and were used for comparative study. No consistent changes in the Rorschach results obtained during hypnosis could be observed. While hypnotically regressed Rorschach records were always substantially different from the control normal records, the difference followed no regular or intelligible pattern. Striking inconsistencies in the subjects' six year old behavior gave further proof that important aspects of the adult personality had by no means suffered ablation, in consequence of the hypnotically suggested regression. The author concluded that neither the Rorschach technique, nor the drawing and handwriting samples gave evidence of true or complete regression. The personality remained adult under the suggestion of regression to the age level of six in hypnosis.

All of the experimenters, including those with negative data, and even those who consider age regression an artifact (Young and Orne), have remarked on the apparent genuineness of the emotional factors in hypnotic age regression. There seems to be little doubt

in anyone's mind that the subject in hypnotic regression experiments feels and acts as if he were a young child.

The historical background of experiments relating to those aspects of memory pertinent to the questions raised in the introduction and which are the objective of this study have been reviewed. The experimenter now presents an elaboration of the thought model which served as a background for the hypotheses.

B. Statement of the Problem

1. Forms of memory. The individual experiences remembering when he is conscious of a gap in time between an event and the reexperiencing of that event in the form of a feeling, image, or thought. Both William Stern (1938) and William James (1950) have expressed the idea that in remembrances the consciousness of the continuity of self between two events is present.

Because remembering is the way the individual experiences "memory" in consciousness, some psychologists like James (1950) defined memory as always having a temporal index, in "my past." Behaviorally, the functions of memory are much more varied and complex. Basically memory is the retention of experience in the individual either with or without the consciousness of a temporal index. Those experiences which have a temporal index have been classified by investigators like Bartlett (1932) and Cameron (1947) under the general heading of remembering. There is no way to designate memory phenomena without a temporal index which is conscious-personal. These have variously been referred to as traces, unconscious memories, automatic

memories, habits, skills, etc. It may be well for the purpose of of classification to divide the forms of memory into two general kinds : those with a conscious-personal temporal index, may be called Remembrances; and those without a conscious-personal temporal index may be referred to as Memoria. Remembering can be involuntary, as when a scene of the past pops into the mind; or voluntary, as when one searches the past for a particular experience. This distinction also applies to Memoria.

In a similar vein, Bergson (1929) has distinguished two fundamentally different forms of memory which are independent from each other. He spoke of one type of memory which imagines and the other type which repeats. Bergson illustrated the independence of these two memory forms with the recall of a lesson learned by heart through repeated recitals. The memory of the first, the second, or third reading, for instance ". . . has none of the marks of a habit for that it is like an event in my life; its essence is to bear a date." (p. 90)

With regard to this dating character of representational memory, Bergson went on to say,

We may even go further and aver that consciousness reveals to us a profound difference, a difference in kind, between the two sorts of recollection. The memory of a given reading is a representation, and only a representation; . . . (p. 91)

In contrast, the mastery of the lesson in recital is no longer a genuine representation;

. . . it is an action. And, in fact, the lesson once learned bears upon it no mark which betrays its origin and classes it in the past; it is part of my present exactly like my habit of walking or writing; it is lived and acted rather than represented. (p. 91)

And, thus, this type of memory is actually the phenomenon of habit which no longer represents the past to us, but acts it, as Bergson said, in the present.

The following chart in Figure 1 may help to clarify how the various forms of memory fit into these classifications. As can be seen, under remembrances are classified recognition, certain kinds of recall, and reliving. Recognition carries with it the implication that, "This specific experience is the same as a specific previous experience." This can be sought after voluntarily or arise involuntarily. Next are listed those aspects of recall which carry with the consciousness of a temporal index. An example of voluntary recall of this type would be the searching for the names of the guests who were present at one's last birthday party. An example of involuntary recall would be free association in which a passive attitude is adopted and memories are permitted to come to the surface without any conscious focusing on any particular point in time or on any particular experience. Voluntary reliving refers to those remembrances of things past which we search for as Proust (1934) did and which come so vividly and intensely that we have the phenomenological and subjective experience of living them through again. Involuntary reliving or abreaction as used by some psychologists refers to the spontaneous living through again of earlier experience which comes about as a result of the psychotherapeutic relationship.

Under Memoria is first listed the voluntary operation of acquired habits and skills such as, playing the piano, driving a car, etc. Then there is voluntary recall with a temporal index but which does not have a personal reference, e.g., when one tries to recall the

<u>Rememberances</u>		<u>Memoria</u>	
Traces with conscious personal temporal index		Traces without conscious personal temporal index	
Voluntary	Involuntary	Voluntary	Involuntary
Recognition	Recognition	Initiation of acquired habits & skills, e.g., speech, playing a well remembered piano piece,	Automatic operation of acquired habits & skills, i.e., reactivation of knowledge such as foreign languages, etc.
Recall, e.g., who was present at my last Birthday party.	Recall, e.g., free association.	Recall, e.g., data learned or "committed" to memory such as, formulas, facts, dates, etc.	Recall a. Certain hallucinatory images. b. Hypnotic hypermnnesia
Reliving, e.g., Proust's "Rememberances of Things Past."	Reliving, e.g., abreaction in psychotherapy when an event is identified as in the past.		Regression a. narcoleptic abreaction b. hypnotic age regression.

FIGURE 1. Forms of Memory.

year Columbus discovered America. This is a non-autobiographical impersonal trace of a date. Under involuntary recall is listed here the phenomenon of hypnotic hypermnnesia. The recall of lost memories under hypnosis often does have a personal temporal index but without normal consciousness. With post hypnotic amnesia, for example, the memory does not come to normal consciousness. If there is no post hypnotic amnesia, then what comes to normal consciousness is the memory of what happened under hypnosis. This memory may some instances become part of normal consciousness so that the actual event recalled in hypnosis has now a conscious-personal temporal index. Or this fails to occur in which case the memory refers only to the hypnotic state. Finally listed under Memoria are such memory phenomena as narcoleptic abreaction and hypnotic age regression. We distinguish this from recall and reliving because the person does not have the experience of a reliving of an event but lives through it as though it were happening for the first time. It appears as though all subsequent experience has been ablated. Support for this distinction can be found in Erickson (1941) who, however, used different terms.

2. Reconstruction and preservation of traces. This schematic diagram of the forms of memory raises an important question for those who seek to maintain a consistent dynamic point of view. Certain forms of memory have been listed under "Memoria" where a memory trace may have been quite faithfully preserved or revived after a long period, even years, have elapsed.

Clinical and experimental evidence has been cited that under certain conditions, such as narcoleptic abreaction, hypnotic age regression, memory traces may remain available over a period of many

years. Also evidence has been cited that dynamic forces of the personality reconstruct or change memory traces of past events. How can these contradictory findings be reconciled within the framework of a dynamic psychology?

On the one hand, Bartlett (1932) attributed the reconstruction of the past that takes place in remembering to the function of the present consciousness. He said, "The attitude is literally an effect of the organism's capacity to turn around upon its own schemata, and is directly a function of consciousness." (p. 213)

From this point of view it seems that the bringing to consciousness of a memory trace results in dynamic changes in the remembrance of the past in accordance with the cognitive and emotional structure of the personality at the time of remembering.

Similarly Schachtel (1949) pointed out that,

Memory as a function of the living personality can be understood only as a capacity for the organization and reconstruction of past experiences and impressions in the service of present needs, fears, and interests.
(p. 198)

Moreover, both Schachtel (1949) and Bartlett (1932) pointed to the fact that changes in memories of the past follow the direction of "conventionalization." Thus, they emphasized that when a memory trace becomes conscious, this very process serves to alter it so as to make possible its integration into the structure of the present personality. The act of making it conscious, the very act of remembering, sets to work certain dynamic forces which change the experience according to the personality at the particular time it is remembered.

On the other hand, certain clinical observations appear to support the idea that some memory traces can remain substantially unchanged as long as they have not been brought to consciousness.

Experimental evidence of hypnotic age regression as well as clinical case studies of the treatment of combat neuroses also support this view. It is well established that some patients under the influence of sodium amytal reenact the traumatic event which was the precipitating factor in their pathology. The patient experiences it as though he were living it for the first time. There is no consciousness of the time gap between the original traumatic experience and the re-enactment of it. The moment the realization of the time gap enters consciousness, then it truly becomes a reliving and takes on the character of what is commonly understood to be remembering. It is only then that remembering as such enters the picture. And it is at this point that the original traumatic event, and its emotional and other psychological effects begin to change. When the patient can experience this as a "memory," he is often on his way to recovery from the traumatic effects of the experience.

The apparent contradiction between the presumed preservation of memory traces and their changes in remembering may be reconciled with the two following propositions :

1. The very act of remembering, i.e., bringing past experience to present consciousness appears to be a process in which memory traces may be altered or reconstructed so as to make possible their integration into the present personality.

2. When certain experiences are not remembered, the trace may remain essentially unaltered so long as it is not brought to present consciousness.

With regard to the first proposition, there is agreement with such authors as Bartlett (1932), Schachtel (1949), William Stern (1938),

Goldstein (1939), and many others to numerous to mention. With regard to the second proposition, agreement is far from general.

Experiments on learning with sub-human and human subjects have led different experimenters to postulate a memory trace which in itself undergoes changes with time. From these observations, theories about the decay of the trace with time have been advanced; as well as theories about dynamic changes, according to the accentuation or levelling of the trace such as that proposed by Koffka (1935) and Wulf (1922).

The experiments on retroactive inhibition by McGeoch and McKinney (1937) and proactive inhibition as discussed by Kohler (1940) seem to argue in favor of altered memory traces. The change depends, for example, upon the nature of interpolated activity during the retention period, so that inactivity such as sleep or rest following a learning period seems to be most beneficial for the preservation of the memory trace.

Without any aspiration to be complete, the experiment on the effect of isolation and crowding of homogeneous material by Kohler and Von Restorff (1935) may be mentioned. This was an experiment in which figure ground relationships within the learned material were proved to be important for the formation of the trace. It would be presumptuous to disregard the weight of this accumulated evidence which shows that memory traces may change and that their change may follow certain laws.

It should, however, be pointed out that the formation of most of the laws concerning the fate and form of the memory trace on the human level are based on tests for the voluntary, i.e., conscious recall or reproduction of previously learned material.

The problem with which the second proposition is concerned must be, therefore, limited to those memory traces concerning which the possibility of preservation in substance could be entertained even if certain alterations have taken place, but the essential characteristics of that experience have not been destroyed.

It is the belief of this experimenter that the least alteration of the memory traces may occur if they can be reactivated under two conditions: (1) when the effect of normal consciousness, in terms of present needs, interests, and functioning can be minimized, and (2) when the memory trace is not isolated from its original context but is reinstated through the reactivation of the cognitive emotional structure of which it is a part to begin with.

From this position the postulation follows that every impression or experience occurs in an organized frame of reference, or is embedded in a cognitive and emotional matrix. And it is this matrix with which a current process must make contact in order to reach a trace, no matter how the trace itself may have changed. This appears substantially to be the view of Koffka (1935) when he raised the question: How does a process communicate with a trace?

. . . and we have already shown why we have to assume an influence of the Ego system upon the trace system-- then we must conclude that the temporal stratification of traces is one of the factors which determine their availability. A trace within its stratum is connected with the Ego of the same stratum, but may be far removed from the Ego of a later stratum. (p. 525)

Koffka went on to point out that recall of events totally forgotten in normal life is possible under hypnosis, ". . . if we assume that in the hypnotic state radical transformations of the Ego system occurs." (p. 527) Koffka was aware that a number of conditions

determine the greater or lesser availability of a trace. We would like to focus on his assertion that the availability of the trace

. . . depends upon proper connection between the trace system and the Ego. Now this connection depends upon a host of factors among which the so-called conative ones are probably of paramount importance. If a trace is derived from a process which was directly connected with a person's interests, then it will have its place in a field formed by a process of high intensity and will be in particularly close connection with the Ego system. Such traces then are favored for many reasons. (p. 526)

The further important conclusion is that when these interests vanish, the traces will become less available. This position may be used as a jumping off point for a general consideration of the reason why previous experiences may have left traces which are still present in their essential features but are not available.

On the face of it, it seems a remarkable fact that the period richest in experience for the individual, the period in which he is continually making new and exciting discoveries about the world and about himself, is nearly obliterated in his conscious memory. Early childhood, during which the individual discovers capacities in himself which he never had before and during which many of his functions change in a short time into new or higher and more intricate and complex ways of functioning, is almost completely lost in a memory blackout.

Thus, individuals have many experiences which are not brought clearly to later consciousness. It is interesting to note that along with the loss of memory of early functioning is an almost complete amnesia for most events which are embedded in the cognitive and emotional structure of early childhood. This is the phenomenon of childhood amnesia which Freud (1938) has called attention to. It

was his contention that childhood amnesia is the result of the repression of infantile sexuality. While it is possible that particular events in an individual's life which are associated with childhood or infantile sexuality may be repressed, one doubts that infantile sexuality could have been so pervasive of the individual's experiences in the first few years of life to account for such a complete blackout of memory.

It is only fair to point out that Freud (1938), at least theoretically, recognized that not all forgetting was due to repression. He said,

Perhaps it is not superfluous to remark that the given explanation (of the forgetting of a name) does not contradict conditions of memory reproduction and forgetting assumed by other psychologists which they see in certain relations and dispositions. Only in certain cases have we added another motive to the factors long recognized as causative in forgetting names and have thus laid bare the mechanism of faulty memory. (p. 39)

Freud assumed that beside the forgetting of proper names, there is another forgetting which is motivated by repression.

Although he apparently recognized that repression is not the only mechanism by which forgetting takes place, much of psychoanalytical theory and all of Freud's ideas on childhood amnesia hold repression responsible for what is no longer remembered. In psychoanalytical theory, repression is considered a defensive function of the ego and a great deal of emphasis is placed on the adaptive function of defense mechanisms. It may be true that, in some cases, the distortion of a memory or the failure to recall a memory serves as a defensive adaptive function for the personality. But it seems no less true that loss of memory may serve the integrative functions of the personality.

Just as the loss of certain functions (sucking reflex) in the biological processes of growth and development have an adaptive function, so the absence of remembrances and "memoria" may be a natural developmental process. When the adult no longer experiences the world in the same way as a child, the dynamic conditions for reinstating childhood memories might no longer exist. Sometimes adults forget things because they have simply outgrown the way they experienced them.

Schachtel (1949) pointed out that within the process of adaptation and adjustment to modern western civilization, the acquisition of conventional modes of experiencing, which are alien and foreign to the modes of experiencing of children, shape the memory function in such a way that they are not suitable to accommodate childhood experiences. He said,

The categories, or schemata of adult memory are not suitable receptacles for early childhood experiences and therefore not fit to preserve these experiences and enable their recall. The functional capacity of the conscious, adult memory is usually limited to those types of experience which the adult consciously makes and is capable of making. (p. 9)

The cognitive and emotional structure of the present personality provide the subjective context for experiencing every event. Hence the memory of that event is inextricably bound within the context of the functions operating in the personality at the time the event first occurs.

Goldstein (1939) stated:

An event can be remembered only in that modality in which it appeared first. Remembrance is normally bound to the figure. The background is only an after effect in conjunction with the figure to which it belongs. (p. 315)

Thus, if the adult has lost the capacity to experience as a child, he cannot be expected to remember those events of childhood which are specifically embedded in childhood ways of experiencing.

We have used the terms, "ways of experiencing," "cognitive and emotional matrix, or structure, or organization," rather loosely and would like to define the meaning of these terms more precisely.

For Schachtel (1949) schema referred to the "conventionalized" organization of experience of the adult without his applying the term to differently organized schemata of experience and behavior in early childhood. Our use of the term functional schemata is, on the one hand, more general and, on the other hand, more specific. It includes both the cognitive aspect such as perception, thinking, etc., and the particular unique emotional aspect of an experience or activity. There is cognitive organization without its concomittant emotional organization: both together make up a functional schema. From a developmental point of view, certain functional schemata must be characteristic of a particular stage or level. Schachtel (1949) characterized the early childhood way of experiencing by emphasizing the uniqueness, the newness, and therefore the intensity of these experiences. In our terminology this would be an important aspect of the early functional schemata which later gets lost by the added layers of conventional and conceptual schemata.

Some functional schemata at developmental levels of very early ages of the person go through many stages of differentiation. As the person matures, there are less changes in the stages of maturation; and for the mature adult the structure of his functional schemata is relatively stable.

The difference between these earlier schemata and the adult way of experiencing can be exemplified by the following:

(1) Piaget (1952a) described an experiment in which he presented to a young child two glasses of water which were identical in shape and size and filled with water to the same height. The child recognized that there was the same amount of water in both glasses. Piaget then produced a third glass which was taller and thinner, and poured the water from one of the first two glasses into the third glass, while the child was watching. When the child was questioned about which had more, he insisted that the taller and thinner glass had more water in it, even though he had seen the water poured from a glass which he had previously admitted contained an identical amount. In this stage, Piaget described the child as being perceptually-form dominated.

(2) In another experiment Piaget (1950) described how, when two moving objects, traversing different distances, left the same point A and arrived at two different places, B and B', at the same time, the four to five year old child acknowledged the simultaneity of the departure; but usually contested the simultaneity of the arrival, although this was easily perceptible. He recognized that one of the objects ceased to move when the other stopped. But he refused to grant that the movements ceased at the same time ". . . because there simply is as yet no time common to different speeds." (p. 136)

(3) Piaget (1950) also described an experiment in which the subject was given two pellets of dough to be modeled into the same size, shape, and weight. Later the subject saw one of them modified in shape and was asked whether the weight and volume remained the same. Up to nine or ten years of age, the subject disputed the fact that the weight was the same.

Piaget (1950) described these stages of children's thinking as preconceptual thought, intuitive thought, concrete operations, etc. They are very difficult to restore in the experience of the adult. It is difficult for the adult to even think or experience in this way any longer. Adults would find it difficult to imagine the time when they could not recognize that two pieces of clay had the same mass and weight because one has changed shape.

Anecdotally, we may add the frequent observation that adults who return to their home town after an absence of many years, often experience the town as having shrunk in size. Here is the persistence of a trace of a former experience which is, however, not in consciousness. Adults are surprised when they have this experience. In contrast, however, a child will not make such distinctions as between the present experience of the smaller city and the knowledge that it must have looked larger before. This observation may be contrasted with the actual experience of the child in the egocentric stage of development, approximately three years of age, who returns to the grandparents' home after an absence of a year and a half, and exclaims when he enters the kitchen, "They must have lowered the sink."

Another factor which may distinguish the early memory functioning of the child from that of the adult is the role of incidental learning. Scheerer (1953) called attention to the phenomena of incidental learning and its possible significance for personality functioning. He defined incidental learning, much as McGeech did, as the learning or behavior modification which occurs without specific motive or conscious intent to learn the material or the activity in question. Citing Rappaport's (1943) observation that memory phenomena in the

widest sense occur continuously in everyday life without the person's instruction or motive to learn, Scheerer (1953), in agreement with G. W. Allport, noted that this seemed to be true in a great deal of learning by children.

In incidental learning, the young child, more than the adult, assimilates material not only without the intent to learn, but also without the awareness that he has learned them. Perhaps the most important incidental learning is that which is connected with the organization of new cognitive functions, attitudes, and values. Cognitive and emotional structure may change almost imperceptibly without the child being aware of the change; or he may be aware of the change, but hardly ever aware of the new processes or the functions through which these changes came about.

A further factor which contributes to the child's lack of awareness of change, as well as the changing qualities of the functional schemata, is the slow emergence of self reflection and self-awareness in childhood. As Schachtel (1949) said,

Within the development of consciousness, the consciousness of self comes latest, and neither individually or in the history of the race has man as yet ever reached anything approaching full consciousness of self. (p. 27)

This generalization agrees with the findings and conclusions of Piaget (1952b) on the development of the introspective capacity in the child.

Consider for a moment Helen Keller's beautifully moving description of her exciting discovery that things have names. This was not only a discovery about the world of things, but also of something new and exciting about her own functioning. It opened up new vistas for her in the things that she could do. All individuals have had such rare moments of discovery or insight about themselves. But the actual

acquiring of new capacities and functions is a slow and gradual process of physical and psychological maturing together with learning. For Helen Keller the moment of conscious realization was sudden because it came so belatedly. For most individuals it was a gradual, almost unnoticed process.

The question arises whether it may be possible to revive or re-establish some functional schemata of childhood in such a manner that adult consciousness does not exert its reconstructing influence on them. If this be the case, then it should also be possible to restore certain events which had been embedded in these schemata, provided the traces have not been essentially altered.

It is self evident that the original context of a past experience cannot be completely restored. We cannot reverse the growth of the organism, nor can we go backward into time. At least, so far as these two factors are concerned, something within the experiencing person has permanently changed. What may be important, however, is that enough of the original context be restored to give the person, now, the experience of phenomenal similarity. If he can experience the situation as being the same, this should be sufficient. Once this can be achieved, then certain functions and events which are context related should be accessible to the personality. This is not dissimilar to Hollingworth's concept of reintegration.

3. Hypnotic regression. The phenomena of hypnotic age regression seemed to offer an excellent opportunity to study early functional schemata in a scientifically controlled manner.

It is not our intention to discuss the nature of hypnosis in this work. We start with certain empirical or clinical facts about

hypnosis regardless of what theory may be used to explain them, and we utilized these to test this theory of memory functioning. Perhaps the theory of memory functioning may shed some light on the phenomena of hypnotic age regression itself.

The conflicting evidence about the genuineness of the age regression phenomenon under hypnosis has been previously presented. The writer remembers hearing a lecture by Jules Masserman ridiculing the phenomena of hypnotic age regression because he had regressed a subject to the sixth month of interuterine life and had asked the subject to describe her surroundings. The subject, although obviously having been regressed to an admitted pre-verbal level, proceeded to describe in adult terms a rather popular conception of what interuterine life is like. It is well known that a subject in deep hypnosis is anxious to please the hypnotist and will do whatever he is directed to do, usually in a quite literal manner. If the subject was asked to describe interuterine life, then she was apt to attempt to do that. One can legitimately raise the question whether the very task or suggestion given to the subject abrogated any possibility of any genuine regressive phenomena being elicited. This is a question which has been ignored by many experimenters. Beigel (1953) pointed out the difference between those responses which lie within the realm of possible experience of the subject and those which do not. He said,

If a person sitting in a summer home at the beach is told that his child has just swum out too far and is in trouble, it does not make a difference as regards his reaction, whether the news is true, erroneous, or invented, as long as the probability of such a happening exists. In hypnosis, just as in reality, a person may, upon such information, reply that he has no child, or that his child cannot swim and that therefore there must be a mistake in identity. We may be in doubt whether to trust

reactions that are outside the realm of the subject's actual experience. If, for instance, it is suggested in the above case that the man who has no child in reality, has one now, he may produce reactions that are what he imagines to be those of a parent. He lacks the actual experience. If, however, the suggested situation lies within the scope of the individual's experiences and differs from actual past ones only in the degree of stress, then we are certainly justified in considering his responses genuine as the real father's response to the true or mistaken account. (p. 15)

Few, if any, have ever taken the precaution to instruct the subject that no matter what task is imposed upon him, he will act in accordance with appropriate age to which he is regressed (see procedure). The failure to take this precaution may account for many of the observations which experimenters have made: that the regressive phenomena is subject to a good deal of variation and fluctuation while it is in progress. We do not intend to indicate that this by any means explains away the fluctuation; even under those circumstances where the instructions are adequate, a certain amount of fluctuation and variation will be found. But this precaution in the giving of instructions will tend to minimize some of the variability. This point emphasizes the importance in any experiment dealing with hypnotic age regression of the manner of inducing regression and the instructions given for the regression. Since both in some degree determine the kind of regression that one achieves in any subject. But even under the best of circumstances, hypnotic age regression appears to be a fluctuating and fluid state. In fact, this fluidity seems to be characteristic not only of age regression, but of the hypnotic state itself.

Brenman, Gill, and Hackner (1947) noted the changes that occurred in a highly fluctuating and variable fashion in people under hypnosis.

The most frequently occurring of these spontaneous phenomena which are characteristic of hypnosis are the changes in body experience. This may be a change in the experience of skin temperature, skin sensitivity, perception of equilibrium, or of body image. Many patients reported sudden warmth or coldness, tingling, numbness, prickly skin, dizziness, and so forth. The authors considered this to be a change in certain aspects of ego functioning and cited that other changes took place as well, for example, the vivid and intense outbursts of emotion accompanying the first hypnotic experience, in particular, and sporadically thereafter.

Ehrenreich (1951) pointed out that a hypnotic subject often reveals a preference for certain types of behavior and disinclination toward or inability to perform other types of behavior; and this is not necessarily in terms of the depth of hypnosis which has been achieved. This statement does not refer to suggestions which conflict with the subject's moral standards, but more to those parts of the induction procedure which are standard suggestions and which are relatively free from emotional significance, or, at least, are not traumatic to a large majority of the subjects. Ehrenreich claimed that the explanation for these are probably to be found in the unconscious needs, wishes, prohibitions, etc., which influence greatly all of a person's behavior as well as his response to hypnosis.

There still remains the question of the nature of this fluctuating and unevenness of performance at regressed ages. Erickson and Kubie (1941) suggested that there were two types of regression. They commented on the nature of these two types,

The search backward toward reliving of an earlier period of life of an hypnotic subject occurs in either of two ways. First, there can be a 'regression' in terms of what the subject as an adult believes, understands, remembers, or imagines about that earlier period of life. In this form of regression, the subject's behavior will be a half conscious dramatization of his present understanding of that previous time, and in which he will behave as he believes would be suitable for him as a child at the suggested age level. The other type of regression is far different in character and significance. It requires an actual revivification of the patterns of behavior of the suggested earlier period of life in terms of only of what actually belong there. It is not a regression through the use of current memories, recollections, or reconstructions of a bygone day. The present itself and all subsequent life and experience are as though they were blotted out. (p. 592)

Weitzenhoffer (1953) had a suggestion that there may be three types of regression: Type I denotes those instances of regression which are strictly an acting out of an adult's opinion of what a child would behave like; Type II denotes a true psychophysiological return to a past state; and Type III which is partly an acting out and partly a shift to an earlier psychophysiological state. He pointed out that thus far no instances of Type II have ever been reported; and that in most hypnotic investigations a mixture of Type I and Type II have been noted.

Wolberg (1948) has also noted that the regression is never stationary, constantly being altered by the intrusion of mental functioning at other age levels. He claimed this fluidity is probably the result of dynamic forces within the personality.

It is important that the apparent reasons for this fluctuating state be examined to determine whether or not such fluctuations would invalidate the use of hypnotic age regression for the purposes of this investigation.

What appears to be genuine physiological regression has been demonstrated by Gidro-Frank and Bowerbuch (1948), True and Stephenson (1951), and others.

Emotionally the nature of the regressed state appears to be such that the subject's feelings and reactions are consistent with the regressed age. Hadfield (1928), Kline (1953), and others all have emphasized the apparent genuineness of the emotional regression. Even those who consider the regression an artifact have remarked on the convincing emotional performance of the regressed subject. For example, Young (1940) said it is playing a role "with all one's heart but not with all one's mind."

It is mainly in the area of cognitive functioning that the fluctuating phenomenon of regression has been noted. Most investigators who challenge the genuineness of regression point to the fluidity of cognitive function in the regressed state as proof that regression is not genuine. This does not appear to be a valid objection. It is like saying that a person who awakened several times at night is not genuinely sleeping, he is only acting like what a waking person thinks a sleeping person acts like. One should not conclude that the cognitive functioning of a person hypnotically regressed is an artifact because it is sometimes contaminated with cognitive structure of a later developmental period. But this is exactly what those experimenters who argue against the genuineness of regression do.

Orne (1951) said the entire situation is,

. . . vividly imagined and finally actively hallucinated. These hallucinations are of a dynamic nature and elicit appropriate behavioristic and emotional reactions. Due to the single mindedness of the hypnotized S, and the thorough preoccupation with the situation, made possible

by the virtual exclusion of outside stimuli. S is now able to respond with purposeful behavior more appropriate to the suggested age level than would be possible in the waking state. When we try to take the role of a child while we are awake, we do not encounter such conditions. In certain aspects of behavior, particularly in intellectual function, we may be able to do even better in approximating the child's behavior than we can in hypnosis. However, we will never be able to act as convincingly in our total behavior. Since we retain our critical judgment, the situation strikes us as somewhat ludicrous and arouses feelings of self-consciousness. Even if these are overcome, we are always aware of playing a part, while the hypnotized person accepts his part as reality. Thus, the convincing impression given by the hypnotized person appears to be caused, not so much by a greater capacity to play the part during hypnosis, but more by the inability, in the normal state, to assume a role fully on an emotional level. (p. 220)

The statement above explicitly assumes that the emotional regression is more apparent than real, that it derives from the greater ability of the hypnotized person to play the role of a child. According to this conception, when a hypnotized adult tries to play the child's role, he can give a better performance insofar as reproducing emotional behavior is concerned, than the adult in the waking state; but the awake person is superior in approximating the intellectual functioning of a child, to the hypnotized adult.

It seems that the basic error these investigators are making is that of assuming that hypnosis is only role playing. Young (1940), Orne (1951), and Sarbin (1950), all presume to have tested their role playing theory. But none of their experiments, in our opinion, have been designed to make an effective test. They have made the methodological error of concluding that because in certain aspects of behavior a hypnotically regressed subject does not act in accordance with the norms of behavior of the age to which he is regressed, then that behavior which is consistent with the regressed age is role

playing. The core of this methodological error lies in their focus on the age norms of regression rather than on the developmental structure or schema of the cognitive and emotional functioning. The reliance on measurements of I.Q. is an example of this kind of methodological weakness. Since hypnotic regression is a fluctuating phenomenon, then the use of age norms such as I.Q. are bound to reflect this fluctuation. The characteristics or structure of those aspects of behavior which are consistent with the behavior of a child at a particular stage of development will be lost or covered by lumping them together with behavior characteristics of later development.

Spiegel, Shaw, and Fishman (1945) elaborated a technique for hypnotic age regression which they felt presented a more controlled and dynamic approach to hypnotic regression phenomena by confronting the regressed person with tasks and challenges which may yield measurable indications of the personality development and dynamics at selected age levels in his past, rather than to collect his life history data only. Each age level may then be studied from the quality and degree of integration of his capacities for adaptation.

A true test of the genuineness of regression demands a careful teasing out of those aspects of hypnotically regressed behavior which do appear to be consistent with the developmental stage of the particular age. Furthermore, a qualitative comparison of the regressed behavior with similar behavior in the simulating adult is necessary, especially with regard to the cognitive and emotional structure operative in the performance of a given task.

Is this kind of qualitative comparison possible. What criteria for it are available? The brilliant work of Piaget and of Werner

have given many insights into the changes of the ways of experiencing of a child. In his studies of the various changes in perception, cognition, feeling, moral judgment, causality, etc., Piaget (1952a) (1950) (1952b) (1952c) (1930) has illustrated that the quality of the experience changes along certain developmental lines. He attempted to delineate these changes by indicating age norms for various types of thinking and perceiving, etc. He pointed out that in the earlier stages of infantile development, sensory motor experiences seem to predominate the total personality. As the child grows older, thought enters into sensory motor experience and gradually takes the predominant role while sensory motor experience takes a subsidiary role. He related these stages of development to the existence and change of functional schemata. These functional schemata are characteristic of the quality of performance over a wide range of functions. Each stage in the development of thinking, social adaptation, i.e., emotional reactions, cognitive and perceptual processes, is marked by certain characteristic ways of functioning.

From this point of view, intelligence tests for children may become true tests of mental age if they are based on an analysis of the processes through which the test responses are achieved. This approach has been advocated and carried out by such investigators as Goldstein (1941) with his criticism of the plus and minus method of testing, Werner (1937) with his distinction between "process and achievement," and Scheerer (1946) who summed up the rationale of this testing approach as follows:

. . . with regard to future research, we should no longer be too willing to depend on a 'plus and minus method of scoring' as a basis of interpreting test responses. Undoubtedly many of us are not content with cluster or

scatter analysis alone and, therefore, we also scrutinize how the subject goes about finding his answer. We then gain a much deeper understanding than we can possibly express on the objective plus and minus record. (p. 656)

With regard to such testing of the way in which the individual functions in order to achieve the particular mental age, Piaget (1950) has suggested a whole new approach to the study of intelligence. That is, by studying the "operations" themselves, rather than the results obtained from these "operations," and establishing a norm for them. As an example, he showed how his associate Inhelder made use of this way of testing:

She was able to show that the order of acquiring concepts of conservation of substance, weight, and volume recurs in its entirety in mental deficient. The last of these three constants (present in only slightly backward individuals, and unknown in really deficient cases) is never found without the other two, nor the second without the first. While conservation of substance occurs without conservation of weight and volume, and that of substance and weight without that of volume. She was able to distinguish moronism from imbecility by the presence of concrete groupings (of which the imbecile is not capable) and slight backwardness by an inability to reason formally, i.e., by incompleteness of operational construction. This is one of the first applications of a method which could be developed further for determining levels of intelligence in general. (p. 154)

We believe that the use of such functional schemata may prove profitable for gauging hypnotic age regression.

It seems obvious that a complete and total regression to childhood is impossible. It is not possible to shrink the adult's body to that of a child. In hypnotic age regression we always have the adult who is behaving like a child. The crucial question is: Does the hypnotically regressed subject function as he imagines a child functions, or is his regressive behavior an actual revival of the memory of how he functioned as a child?

Our thesis rests upon the postulation that both forms of behavior exist in every hypnotically regressed state in varying degrees based upon the availability of earlier schemata of functioning. Where the memory trace is available, the hypnotically regressed subject will function on the basis of an actual revivification of earlier functional schemata; and where the memories are not available, he will utilize other available memories from later stages of development, or he will fabulize. When earlier functioning is not available, we are likely to have the kind of regression referred to by Weitzenhoffer as Type I. When earlier functioning is completely available, we would have a Type II regression. When earlier functioning is available to a sufficient degree to give the subject the experience of phenomenal similarity, we would have the Type III regression, which is partly an acting out and partly a shift to an earlier psychophysiological state; and is what we expected to obtain in our experiment. The apparent genuineness of the emotional regression in a Type III could be attributed to the subjective experience of phenomenal similarity as a result of the availability of sufficient memory traces of functioning or functional schemata.

C. Hypotheses

1. General. It is the thesis of this investigation that it is in the nature of memory function that:

1. The content and form of an experience is contextually bound within the cognitive and emotional organization (functional schemata) characteristic for the person at the time of its occurrence.

2. Remembering, voluntary or involuntary, is the reconstruction of a previous experience in such a way that it can become integrated into the functional schemata of the personality at the time of remembering.

3. Ways of experiencing and experienced events belonging to functional schemata which are no longer available to the person will not ordinarily be available for remembering.

4. If functional schemata, not ordinarily available to the person should become accessible, then certain experiences of inner and outer states associated with such schemata may also become available.

5. Hypnotic age regression is a fluid phenomenon in which the subject may fluctuate between behavior which is based on an actual revivification of earlier functional schemata and behavior which is based on available memories at later developmental stages or present imaginative constructions. For this reason hypnotic age regression is thought to be a suitable instrument for the reactivation of trace systems (functional schemata) and specific traces.

2. Specific. It is the plan of this research to demonstrate that:

1. When subjects are hypnotically regressed to the ages of ten, seven, and four schematic organization of their functioning on a series of tasks will to a larger extent be similar to that of children at the same level.

2. When subjects simulate the ages of ten, seven, and four, the schematic organization of their functioning will be less similar

to children of the same levels than that of the hypnotically subjects.

3. As compared with the simulating subjects at each of the age levels of ten, seven, and four, hypnotically regressed subjects will remember more specific events embedded in the context of their early functional schemata and the corresponding environmental situation.

II. APPARATUS AND PROCEDURE

It was our intention to show that the hypnotic subjects, when regressed, will in certain test situations behave in a manner consistent with the functioning of a child of the same age to which they are regressed. Certain perceptual, cognitive, and emotional tasks were selected to illustrate this point. Some of the tasks are reproductions of Piaget's work with children. Others have been improvised because they have the cognitive structure of children of certain ages, and because it is particularly difficult for an adult who may be simulating to guess the appropriate mode of functioning. The following is a description of the various tasks used, the rationale for their use, and a description of the procedure followed.

A. Perceptual-Cognitive Reasoning

1. Hollow Tube Test. In an ingenious experiment, Piaget (1950) has shown that a child in the preconceptual period is unable to reverse in thought the order of objects which he sees disappearing into a tube. For example, 3 balls, a, b, and c are placed into a cardboard tube so constructed that the balls cannot change their relative position. Then the elements a, b, and c are moved through the tube and the child has to predict the order in which they will emerge at the other end, that is, their original order and the opposite order of emergence when they return. According to Piaget, all children foresee the original order. The opposite order is beyond them until four or five years, the end of the preconceptual period.

Next, the whole apparatus is turned through 180 degrees. The subject has to predict the order of emergence which is thus reversed. After the child himself has checked the result, the tube is turned through two half circles, 360 degrees in all, then three, etc. From four to seven years of age, the subject is unable to foresee that half a turn will change the order a,b,c, into c,b,a. Then having put the matter to the test, he admits that a half turn will actually produce c,b,a. Having gone through this experience he is no better able to predict the effect of two half turns.

At a later age, even the child who has grasped the idea of the reversibility of the balls, may still not be able to formulate the principle that an odd number of turns will always produce the same result as a 180 degree turn and even number will always produce the same result as a 360 degree turn. Thus, if we ask a child seven or eight years old what the order of the balls would be if we turned the tube around fifteen times or twenty times, he is unable to give the answer. However, the normal adult is capable of grasping the principle of reversibility and at the same time also grasping the principle of odd and even turns. The advantage of this test is that there are various levels of functioning according to the age of the child. The adult should be able to handle this problem without any difficulty, but when regressed, his functioning will approximate the functioning of the child of the particularly regressed age.

The procedure for the hollow tube test was as follows:

A green, yellow, and red bead were tied on a string approximately four inches apart, in that order. A hollow tube

approximately one inch in diameter and about fourteen inches long was used, together with the beads and string. The examiner sat opposite the subject and said, "Now look carefully, here we have a string with three beads on it. They are all different colors. This one is green, this one is yellow and this one is red." The subject was then asked to repeat the colors as the examiner pointed to the beads in that order. After the subject repeated the colors, the examiner said, "Now, watch me carefully. I am going to take the beads and put them through the tube like this." The examiner then inserted the string of beads in the tube, the green one entering the tube first, and pulled the beads through the tube to the point where they were no longer visible to the subject. The examiner then said to the subject, "Now, if I keep on pulling them through, which one will come out first, which one will be next, and which one will be next?"

After the subject gave his response, the examiner pulled the string of beads through so that the subject could check his responses. If they were correct, the examiner acknowledged that they were correct. If they were incorrect, the examiner pointed out exactly where the subject was wrong. The beads were then pulled back into the tube until they were no longer visible. The examiner then said, "Now, if I pull the beads this way (indicating the opposite end of the tube) which bead will come out first?" Again, the responses were noted and again the subject was given the opportunity to compare his responses with what actually happened. The beads were then pulled back into the tube and out of sight.

The subject had now had an opportunity to actually see in what order the beads appear from each end of the tube.

He was then asked by the examiner, "Now, if I turn the tube over this way (The examiner then turned the tube 180 degrees. The order of the beads was thus reversed) which one will come out first, then which one, and then which one?"

Again the subject's responses were checked by pulling the beads out and the procedure was repeated by pulling the beads back through the other end of the tube.

Once again, after the subject had given his responses and had an opportunity to compare his responses with the actual result, the tube was then again turned 180 degrees and the examiner asked, "Now, if I turn the tube this way, which one will come out first?" Then the same procedure was repeated.

After the responses had been noted, the examiner then said, "Now, watch me carefully, if I turn the tube over fifteen times like this (The examiner then demonstrated by turning the tube through fifteen, 180 degree turns) which one will come out first?"

After the subject gave this response, the examiner asked "How did you know?" Then the examiner said, "Now, if I had turned the tube over twenty times, which one would come out first?" Again the examiner asked the subject, after he gave his response, "How did you know?"

This is the end of the test.

B. Spatial-Symbolic Relations

Certain tasks were selected which would illustrate that the regressed adult would act cognitively in a manner consistent with

the cognitive functioning usually found in children of the same age. It was difficult to draw a fine distinction between perceptual and cognitive tasks, since many tasks involved both perceptive and cognitive functions.

Thus, there had to be an arbitrary division of the tasks into perceptive and cognitive ones. Where it was felt the tasks mainly involved perceptive functions, it was listed under perceptual-cognitive and those which mainly involved cognitive functions, were listed under this heading.

1. Left and Right Test. Piaget (1952b) found that there were three stages in the child's understanding of right and left. The first stage, at about the ages from five to eight, is that in which left and right are considered only from the child's own point of view.

The second stage, ages eight to eleven, is that in which left and right are also considered from the point of view of the other person.

Here again, the intention was to show that adults who are regressed will function in the same manner as Piaget's children functioned when faced with the left and right tasks.

The procedure for the tasks was as follows:

The experimenter sat opposite the subject at a small table.

1. The experimenter said to the subject, "Show me your right hand?"
"Show me your left hand?"
2. "Show me my right hand?" "Now, show me my left hand?"
3. (A penny was placed on the table to the left of a pencil in relation to the child) The experimenter asked, "Is the pencil to

the left or to the right?" "Is the penny to the left or to the right?"

4. (The subject was opposite the experimenter who had a penny in his right hand and a key in his left hand) The experimenter said, "You see this penny? Have I got it in my right hand or in my left? And the pencil?"

2. Clock Test. The next task was designed to show the developmental stage of the cognitive-symbolic function. The ability to tell time includes several developmental levels of symbolic functioning. In the first stages the numbers on the face of the clock represent hours only. At a later stage the concept of the numbers symbolizing both hours and minutes is developed, but the number still retains only one value. Still later the concept that a single number may have two values, one in hours, the other in minutes is developed.

While there are not criteria norms for the various ages at which these concepts develop, the S's were regressed to ages far enough apart that at each age their performance would be qualitatively different insofar as their cognitive-symbolic function was concerned.

The procedure was as follows: E. said,

"Here is a clock. Can you tell time? Let's try to tell what time it is."

E. set clock at three o'clock. "What time is it?"

E. set clock at six o'clock. "What time is it now?"

E. set clock at nine o'clock. "Now what time is it?"

E. set clock at fifteen past one. "Now what time is it?"
 E. set clock at half past one. "Now what time is it?"
 E. set clock at a quarter to two. "Now what time is it?"
 E. set clock at ten after two. "Now what time is it?"
 E. set clock at twenty to three. "Now what time is it?"
 E. then said, "You set the hands so that the clock reads:
"twelve o'clock," "two o'clock," "fifteen or a quarter after
two," "half past two," "twenty minutes to three."

C. Number Relations

1. Arithmetic Test. The third task was an attempt to compare the functional schemata of the subjects with the functioning of children in arithmetic tasks. An idea of Piaget's was combined with our own in this task. It seems fairly well established that when children first learn arithmetic, they learn it by rote, without being able to understand the principles of multiplication and division, of addition and subtraction. Therefore, if an adult is given a task which involves addition and subtraction, multiplication and division, he should be able to tell how he arrived at his answer by using the principles involved. A child, on the other hand, would not be able to tell the principles involved, but his explanation of the way in which he arrived at the answer may indicate the mental processes involved.

E. sat at a table facing S. who was regressed to a particular age level and then said, "I have some arithmetic questions I'd like to ask you. How much is $2 \div 2$? How much is $4 \div 2$? How much

is $2 \div 2 = 2$? How much is $4 \div 2 = 2$? How much is $2 \times 2 + 2$?"

After each answer the subject was asked, "How did you get that? How did you find out?" The time S. took to answer the question was recorded.

The following questions were also asked: "Three little girls are given 9 apples, how many will each have?" "It takes twenty minutes to walk downtown; I can go twice as fast on a bicycle; how long will it take me to go downtown?" After each answer was given, the subject was asked, "How did you get that? How did you find out?"

D. Direction of Thought in Word Association

1. Word Association Test. In this area it was the intention to show the direction of thought of subjects who are regressed. An attempt was made to select a task in which there is a sharp differentiation between the way adults and children react to the same situation, and which adults would find difficult to simulate.

The Kent-Rosanoff (1910) studies and the work of Woodrow and Lowell (1916) have shown quite clearly that adults and children respond differently to the same word. While adults usually reply with an opposite or a superordinate, the children are more than likely to "stay with" the word. Thus, where most adults would respond to dark with its opposite light, or with the response night, children are more likely to respond with something like night or black.

Thus, a list of words was prepared, some of which were taken from the Kent-Rosanoff tables for adults because they showed a definite characteristic trend in the responses of adults, some of

which were taken from the Woodrow and Lowell tables for children and showed a definite characteristic trend in the responses of children. The prediction was that the regressed subject would tend toward the characteristic responses of children, whereas, the controls would tend toward the responses characteristic of adults. The following figure shows the stimulus word and the response with the highest frequency for adults and for children:

<u>Stimulus Word</u>	<u>Most Frequent Responses</u>	
	<u>Adults</u>	<u>Children</u>
Table	chair	eat
Dark	light	night
Man	woman	work
Deep	shallow	hole
Soft	hard	pillow
Mountain	high	high
Red	color	color
Hand	foot	fingers
Soldier	man	war
Bad	(not given)	(not given)

Figure 2. Most frequent response

In addition to the above list some words were inserted which were above the understanding of children of the ages to which the subjects were regressed.

If they were understood, the nature of the words was such that they would produce an emotional reaction, which would be reflected

either in the nature of the response or the reaction time. In one case, it was the word "television" which could not have existed at the time the subject was the particular age, and in the other cases, they were words which are not usually understood until very late in the education of the individual. It was the expectation that the regressed subjects would not be able to respond to either of these words. They might inquire what the words mean or they might fabulize a response, on the basis of a clang association, or use some other way out of the dilemma. The controls should find it is difficult to know exactly how a child responds to a word. Under the pressure of time, they will have to suppress their first adult response and think of a second response, if they do this, their reaction time should show up to be considerably longer, if they do not their responses should be adult ones. Our hypothesis is that this particular test should show a clear difference between controls and regressed subjects.

The procedure for the word association test was as follows:

The experimenter sat opposite the subject and said to the subject.

I am going to say some words. I want you to tell me the first word that comes into your mind when I say a particular word. For example, if I say, black what is the first word that comes to your mind? After S. responded, the examiner said, That's right. Now, I am going to read this list of words, I want you to respond as quickly as you can. Be very quick, give me the first word that comes to your mind.

Experimenter then read the following list of words in the following order: table, dark, myth, man, deep, penis, soft, mountain, red, hand, vagina, soldier, bad, television.

E. Emotional

1. Mud and Lollipop Test. In the next test, the experimenter brought the regressed subject to a sandbox in the playroom and asked the subject to make some mudpies. S. was supplied with a basin of water and was asked to mix the sand and water to make mud and to make some mudpies. He was allowed to play in this manner for approximately five minutes, and during this time he was questioned as to his reactions to this kind of play and his reactions to mud and dirt. When the play period was over, the experimenter simply thanked the subject for his cooperation and offered him a lollipop without offering him in any way an opportunity to clean his hands. It was assumed that the S. would express feelings of pleasure about working with mudpies and would not be disturbed about eating a lollipop with muddy, dirty hands. However, after the subject had been sucking on a lollipop for a few minutes, he was asked to sit down and he was brought back to his conscious waking state. His reactions to his dirty hands and the fact that he had a lollipop in his hands was then noted and observed. The hypothesis was that the subjects would express disgust or discomfort at the fact that they were eating something with dirty hands. It was expected that the controls would have a great deal of difficulty accepting the lollipop or eating it with dirty hands and would show signs of discomfort, even though they might make an attempt to carry out the required task.

F. Contextual Recall

1. Questionnaire. All of the foregoing tasks had as their

aim, testing the re-establishment of certain functional schemata. They were designed to show that under hypnotic age regression, the subject is able to recall how he functioned as a child, not only in relation to tasks which he has already performed as a child, but in relation to similar but new tasks which he may never have performed at all.

The following experiments were designed to test the recall of specific events in context. It is our hypothesis that recall of specific events is very much improved when the functional context in which they were first experienced is sufficiently re-established. For this purpose, some tasks were designed in which the subject would be regressed to the particular time that an event occurred and his memory of that event would be tested.

The first method for testing the recall of specific events in context was the use of the questionnaire. Subjects were required to fill out a questionnaire in the waking state which asked certain specific questions about events that took place at specific ages. It was hypothesized that many of these events would not be remembered or recalled. The subject was then regressed to the particular age at which these events were supposed to have occurred and orally given the questionnaire again. According to the hypothesis, many of the gaps in memory should then be filled in because the subject would now be able to re-experience the specific events within the context of its original experience.

Questionnaire for the Adult Waking State

1. What is your name?
2. Where do you live?
3. Where did you live when you were (4) years old (describe)?
4. What grade school did you go to?
5. How old are you? _____ Birthdate? _____
6. What grade were you in when you were 7 years old?
7. What grade were you in when you were 10 years old?
8. What day of the week did your 10th birthday fall on?
9. What day of the week did your 7th birthday fall on?
10. What was the name of your second grade teacher?
11. What was the name of your fifth grade teacher ?
12. Where did you sit in your 2nd grade room?
13. Where did you sit in your 5th grade room?
14. Who sat in front of you in the 2nd grade?
15. Who sat in front of you in the 5th grade?
16. Who sat behind you in the 2nd grade?
17. Who sat behind you in the 5th grade?
18. What subjects did you study in the 2nd grade?
19. What subjects did you study in the 5th grade?
20. What books did you use in the 2nd grade?
21. What books did you use in the 5th grade?
22. Did you ever take music lessons, if so, please state when and
for how long?
23. Do you still play the same instrument?

Questions Orally Asked of Subjects Regressed to Age Ten

1. What is your name?
2. How old are you?
3. Where do you live?
4. What school do you go to?
5. What grade were you in when you were 7 years old?
6. Is this your 10th birthday?
7. What day of the week is this?
8. What day of the week was it when you had your 7th birthday?
9. What is the name of your teacher?
10. What was the name of your 2nd grade teacher?
11. Where do you sit in school?
12. Where did you sit in the 2nd grade room?
13. Who sits in front of you in school now?
14. Who sits behind you in school now?
15. Who sat in front of you when you were in the second grade?
16. Who sat behind you when you were in the second grade?
17. What subjects are you studying now?
18. What books do you use now?
19. What subjects did you study in the second grade?
20. What books did you use in the second grade?
21. What is your lesson in (pick one subject) for today?

Questions Orally Asked of Subjects Regressed to Age Seven

1. What is your name?
2. How old are you?
3. Where do you live?
4. What school do you go to?
5. What grade are you in?
6. Is this your 7th birthday?
7. What day of the week is it?
8. Who is your teacher? What is the name of your teacher?
9. Where do you sit in school?
10. Who sits in front of you?
11. Who sits behind you?
12. What are you studying in school now?
13. What books are you using in school now?
14. What is your lesson in (pick one subject) for today?

2. Pledge Allegiance. The next test of recall of specific events was based on a study of New York public school children ten years old. Children in the fourth grade were asked to write the Pledge Allegiance to the Flag of the United States. It was found that, although the children are taught the Pledge of Allegiance when they are six years old and they continue to recite it at least twice a week, many of them, by the time they are ten, still do not understand the pledge. It is evident from what they wrote that some words of the pledge often have little meaning for them. For example, one child wrote, "I pledge a legion to the flag of the U.S. of America and to the republic of Richard Sands, etc." Since there was little doubt that the subjects in the adult waking state would be able to write the Pledge Allegiance to the Flag of the United States without any difficulty, the experimenter did not ask them to do this. However, when they were regressed to age seven and age ten, the experimenter asked them to write the pledge.

The experimenter first asked the subject to recite the Pledge Allegiance to the Flag, and then asked if he could write it on a piece of paper. The expectation was that at age seven the regressed subjects would not be able to write the pledge.

3. Individual Recall. Because of the difficulty of finding good somnambulists as subjects, it could not be determined in advance what unique personal experiences could be brought back to memory. For this reason each hypnotic subject was asked to have his parents prepare a packet of old text-books, note books, scrap books etc. They were instructed to have their parents seal the packet and bring it to the experimenter. One such sealed packet was delivered to the

experimenter by one of the subject's parents. The experimenter then examined the material and prepared a list of questions for the subject to answer in the waking state and in the regressed state.

G. Behavioral Description.

In addition to all the above tasks both control and hypnotic subjects were given a period of ten minutes free play with the toys in the playroom before they were asked to do the tasks. An observer who wrote a behavioral description of everything that transpired was present at all sessions.

H. Experimental Design and Selection of Subjects

The subjects consisted of a group of fifteen controls and five somnambules. They were all university students between the ages of nineteen and twenty-seven.

1. The Controls. This group consisted of fifteen subjects and were divided into three groups of five. Each group was asked to simulate a different age. Five controls simulated the age of ten; five simulated the age of seven; and five simulated the age of four. Figure 3 shows what ages each of our subjects were assigned to. Every subject was asked to fill out the questionnaire for the adult waking state first. Since familiarity with the Word Association Test might affect the performance on the test, the experimenter gave the test to half of the control subjects before they simulated and the other half after they went through the simulation procedure.

Subject	Waking	State	Somnambulist		Simulation			Regression		
			State	Quest.	10	7	4	10	7	4
I	X	X					X			
II	X	X				X				
III	X	X			X					
IV	X	X					X			
V	X	X				X				
VI	X	X			X					
VII	X	X					X			
VIII	X	X				X				
IX	X	X			X					
X	X	X					X			
XI	X	X					X			
XII	X	X				X				
XIII	X	X				X				
XIV	X	X			X					
XV	X	X			X					
Experimental										
A	X	X	X					X	X	X
B	X	X	X					X	X	X
C	X	X	X					X	X	X
D	X	X	X					X	X	X
E	X	X	X					X	X	X

Figure 3. Experimental Design.

After the subject had filled out the questionnaire, the following instructions were read to each control subject:

Before we begin the actual hypnosis experiment, there are certain tests I would like to give to help me determine whether or not you will make a good subject. I would therefore like you to cooperate with me in these tasks to the best of your ability. I am going to take you into a playroom where there are lots of toys. As long as you are in that playroom, no matter who talks to you, or what you are asked to do, I would like you to pretend that you are (age) years old. When you walk into that playroom pretend that it is the day of your (age) birthday. Think like you did when you were (age) years old. Walk like you did when you were (age) years old. And talk like you did when you were (age) years old.

I would like you to continue this until we leave the playroom. At no time step out of your role. Try to be (age) years old every second you are there. Forget everything you have learned since you were (age) years old. If any questions are asked you, try to answer them as you would have answered them when you were (age) years old. When we go into the playroom, I would like you to begin to play with the toys like you were (age) years old and continue playing until I ask you to do something else. Any questions?

The experimenter then answered any questions. And if there were no questions, he continued,

Start putting yourself into the frame of mind of a (age) year old. Now we are going back to the time when you were (age) years old. Let's go into the playroom.

In order to make simulation easy for the controls, they were allowed to play with the toys in the playroom for ten minutes. After this acclimatizing period, the subject was asked to sit at a little table opposite the experimenter. The experimenter then asked him questions from the appropriate questionnaire. The experimenter then proceeded to the administration of the several tests in the following order.

Testing Procedure in the Playroom for Each Age Group

<u>Age 10</u>	<u>Age 7</u>	<u>Age 4</u>
Free Play	Free Play	Free Play
Questionnaire	Questionnaire	Hollow Tube
Hollow Tube	Hollow Tube	Left and Right
Left and Right	Word Association	Word Association
Word Association	Arithmetic	Clock
Arithmetic	Pledge	Mud and Lollipop
Pledge Allegiance	Clock	

2. The Experimental Subjects. These subjects were all given the questionnaire for the adult waking state and the Word Association Test. They were then given a period of hypnotic training.

Erickson and Erickson (1941) have pointed out that the standardized technique for the giving of identical suggestions to different subjects described by Hull (1933) was not, as he appeared to believe, a control method for eliciting the same degree or type of response, but merely a measure of demonstrating the general limitations of such a technique. Erickson and Erickson claim that extreme care in wording suggestions is highly essential and it should never be assumed that the subject's understanding of instructions is identical with that of the hypnotist's. Neither should there be the assumption that an identical wording must necessarily convey an identical meaning to

different subjects. For this reason, although a general method of procedure with the wording outlined was adopted, the experimenter did not hesitate to change the wording in any way that would convey essentially the same meaning to the subject where this was necessary.

The induction procedure followed was that outlined by Wolberg (1948). After a brief discussion with the subject about the nature of hypnotism, the subject was asked to relax. Suggestions were then given to the subject that he was getting sleepy, tired and drowsy, and that his eyelids were getting heavier and heavier and would soon close. The suggestions were continued until eyelid catalepsy was established. The subject was then taken deeper and deeper into the trance state by the elicitation of the various phenomena indicative of the degree of trance depth. The following order of hypnotic phenomena was followed:

1. eye closure
2. hand levitation
3. limb catalepsy
4. body catalepsy
5. hand clasp test
6. inability to pronounce name
7. automatic revolving of hands
8. hyperesthesia
9. anesthesia
10. ability to talk in the trance state
11. positive hallucinations
 - (a) auditory
 - (b) olfactory
 - (c) visual
12. opening of eyes in the trance state
13. somnambulism
14. post hypnotic suggestion
15. post hypnotic amnesia

The experimenter continued to elicit the various phenomena and to deepen the trance until the subject showed hesitation or difficulty in responding to a particular suggestion. The

experimenter then said, "You probably felt yourself beginning to respond to the suggestion. This shows that the suggestion is taking. Next time you will respond much more quickly and much more strongly to the suggestion."

The subject was then awakened and another appointment scheduled. At each subsequent session the trance was deepened until all the phenomena of somnambulism were demonstrated.

Gorton (1949) has noted that individuals show a wide range of differences as far as hypnotizability is concerned, and vary widely in their behavior in the hypnotic state. The personality of the operator as well as the attitude of the subject which in turn depend upon his feelings toward the operator will determine the depth of trance achieved. He pointed out that there is not any objective somatic criteria in hypnosis and that the depth of trance that can be obtained in different individuals varies considerably. Wolberg (1948) also pointed out that individuals may be able to perform or to carry out certain suggestions which are characteristic of a deeper trance but may not be able to carry out suggestions characteristic of the lighter states of trance. This variability makes it extremely difficult to determine any objective criteria for depth of trance. However, all experimenters agree that somnambulist state, the ability to open one's eyes without waking, positive and negative hallucinations, and post hypnotic amnesia are all characteristic of deep trance state or somnambulist state. It is these which were used as criteria.

In the somnambulistic state and before he was regressed, the subject was asked to fill out the adult questionnaire. He was told, "I have a questionnaire I would like to have you fill out. Read the instructions on top and fill out the questionnaire." After he had filled out the questionnaire in the somnambulistic state, training was begun for hypnotic age regression. The subject trained for regression by regressing him to an age of early adolescence. While under regression, the subject's behavior was carefully scrutinized. When the experimenter was convinced that true regression had been established, the subject was regressed to age ten and the experiment begun.

The instructions for regression were very carefully chosen in order to assure the maximum possibility of regression. The subject was regressed to his birthday because, as Spiegel, Shaw and Fishman (1945) have pointed out, a birthday is a precise, objectively definable day without the ambiguity of any simple suggestion such as you are now seven years old. The birthday is usually of some emotional significance. They found that hypnotic regression was more easily obtained for emotionally significant days or occasions. The operator was also careful to take precautions to maintain rapport when true regression was established. Erickson and Kubie (1941) pointed out that the deletion of the hypnotist in true regression creates an additional difficulty and that the hypnotist must make provision for over-coming this difficulty by transforming himself into someone known to the patient during the earlier period by suggesting that he is "someone you know, and you like and you like

to talk to." This was included in the regression instructions to the subject.

The instructions follow:

Now, I want you to listen very carefully. In a short while, I am going to start counting from twenty-one back to ten. As I count you will feel yourself getting smaller and smaller and younger and younger. When I reach ten, you will be ten years old. It will be your tenth birthday. As I count from twenty-one back to ten, as I count each number off backwards, you will forget everything that happened from that age on, so that by the time I have reached the number ten, you will have forgotten everything that you learned or everything that happened to you after you were ten years old. When I reach the number ten, you will be ten years old. You will think like a ten year old. You will act like a ten year old. You will walk like a ten year old. You will talk like a ten year old. In fact, you will be ten years old. No matter what you do, no matter who you talk to, you will respond as a ten year old. You will be ten years old. When I reach the number ten, you will slowly open your eyes. You will look around the room. You will see a rather pleasant and comfortable room. You will see me. I will be somebody that you know and you like, and like to talk to. You will see Mrs. B. (the observer). She will be somebody who is friendly but you won't pay much attention to her. I will be somebody you know, you like and you like to talk to. When I reach the number ten, you will open your eyes. You will walk, and you will talk, and you will act in every way like a ten year old. When you open your eyes, you and I will talk for awhile.

Then I will ask you if you would like to go with me into a playroom where there are lots of toys. You will feel happy about it and will say yes. We will go into the playroom and you will play with the toys for a period of time. Then I will ask you some questions and we will play some games.

After we have played some games and I have asked some questions, I will again bring you back into this room. I will then ask you to close your eyes. I will start counting from ten back to twenty-one. When I reach twenty-one, you will be at your present age. Is this clear? I am going to start counting now.

The subjects were regressed to age ten, seven, and four respectively. The same instructions for regression were given

at ages ten, seven, and four. The only change being that of the age. The subjects were always regressed to the suggested age from their chronological age. Some subjects were tested at two of the suggested ages in one hypnotic session but they were always brought back to their chronological age after each of the suggested ages. It should be noted that at no point in the entire experiment was any direct suggestion to remember given. Hull (1933) maintained that the suggestion to remember either direct or indirect is responsible for increased memory under hypnosis. If any indirect suggestions were given, they apply to all phases of the experiment since every task was presented to the subjects in the same manner except for the questionnaire which was read to the subjects under regression but given to them to fill out in the adult waking and somnambulist state.

As previously mentioned, an observer was present at all sessions, both waking and hypnotic. The observer described as fully as possible what she saw and at the same time made a verbatim report of everything that was said.

III. RESULTS

A. Method of Analyzing the Data

The purpose of most of the experimental tasks was to tease out as specifically as possible some aspects of the cognitive structure at the developmental stages chosen for this study. The method of analyzing the test results differs from the usual "plus and minus" method of scoring. This analysis requires the use of methods designed to reveal process rather than just the presence or absence of particular content. Performance analysis, using the principles outlined by Scheerer (1946) was the basic approach to the data. The focus was, therefore, not so much on the mere occurrence of a failure by a subject on any particular problem, as it was on the process which might have led to such a performance. It has been theoretically hypothesized that these processes might belong to the postulated functional schemata which may have certain performance characteristics. An attempt was made therefore to analyze the experimental data in terms of the hypothesized performance level characteristics required by the respective tasks.

Scheerer (1946) had said,

In determining the psychological requirements for task solution, we must also consider the hierarchic order of functional levels, the different capacity stages on which a subject may operate in reaching the same overt result. In children these stages are developmentally conditioned, while in the adult it is motivation, attitude, or set that will determine on which level he copes with the task. (p. 658)

It will be our plan, as the data for each test is presented to indicate the expected performance characteristic for each developmental level as based upon the findings of Piaget and others, For the purposes of this particular investigation the presupposition

was made that the criteria found by Piaget in his work with children apply to children in this country as well. This pre-supposition, of course, needs to be investigated by further research.

There will be also be presented the functional processes presumed to be characteristic of each level. The scoring of each of the tests was based upon the performance level and not upon right or wrong responses to each of the questions. When a given response showed the characteristic of a particular level either in its content or by process of elaboration, the response was scored as reflecting function at that particular level, regardless of whether the answer was factually correct or incorrect.

Since several performance levels may be characteristic of a particular chronological age, the ages at which the particular performance may be expected have been listed. Thus, there is always both a performance level and a chronological age level. For example, at the chronological age of seven there may be four differentiated levels of performance all of which may develop about the chronological age of seven, so that any subject who performed at level one to four may be regarded as having achieved the age level of seven.

The experimental problem and the methods used did not permit the use of a large number of subjects. Because of the special limitations of population size, a good many of the tables presented are based upon the scores of only five subjects in each group. Such a group size obviously does not permit any assumptions about the distribution of the larger population.

For this reason, non-parametric tests, e.g., Tau coefficients, which make no assumption about the distribution of the parent population had to be used to indicate even general tendencies. Measures such as the Tau coefficient give us a measure of relationship which does not depend for its validity upon the assumption of a normal bivariate universe. With the size groups represented, these coefficients would primarily reflect tendencies which could be made the basis for further hypothesis and investigation.

In most cases, the raw data represented the responses of the experimental and control subjects at certain performance levels. These do not represent scores or percentages, but simply ways of ranking the subjects. In such cases τ_{pb} which is a rank biserial correlation coefficient as described by Kendall (1948) was used. In those cases where the data did not consist of comparisons of experimental and control subjects, but of comparisons of the same subjects under different conditions, a Student's t test was used, and, wherever possible an analysis of variance was computed. The small number of cases on which all these computations are based was a constant factor in keeping the investigator aware of the limitations imposed upon the interpretation of the results. In a few cases, Fisher's (1938) direct method for the calculation of the probability of a set of observed frequencies in a 2×2 contingency table was employed. The complete transcript of the observations and verbatim responses of the subjects ran to several hundred pages. It was felt that inclusion of this totality of raw

data was neither feasible nor directly contributory to the immediate purposes reflected by the present study. However, sample protocols for each of the experimental and control conditions were selected and placed in the appendix in order to give an appreciation for the basic data which is the core of this study.

B. Quantitative Analysis of Cognitive Tasks

1. The Hollow Tube Test. This test was presented to both simulators and regressed subjects at the experimental ages of ten, seven and four.

The test consisted of six questions. The solution of each question required a particular level of perceptual-cognitive development. The questions increased in difficulty and complexity and therefore the corresponding performance levels were arranged along a dimension of developmental sequence. These have been outlined by Piaget (1950).

The first question at level one required the ability to preserve the perceived order of objects in the absence of the previously presented objects (principle of conservation of objects). Having seen the beads in the order, green-yellow-red, before they were pulled into the tube, the child should therefore be able to predict the order of the beads when they emerge from the tube at the other end, (green-yellow-red). Piaget has claimed that before the age of four, the child is unable, without perceptual support, to grasp the constancy of order. Since none of the subjects were hypnotically regressed below the age of four, the prediction was that all of the hypnotic subjects should be able to perform this task successfully

at the experimental ages of four, seven and ten.

The second question at level two required the ability to imagine a simple reversal of the order. Having seen the beads emerge from the tube in the order, green-yellow-red, at one end, the subject should be able to predict the reverse order of the beads, (i.e., red-yellow-green) when the beads have been pulled back into the tube and their emergence from the tube at the opposite end was awaited. Piaget's findings show that for his subjects between four and seven years of age this prediction could be made. Thus, it was anticipated that all of the hypnotic subjects should be able to successfully perform this task at four, seven and ten.

Question three at level three required the ability to imagine the order of emergence after 180° turn of the tube with the beads not in direct evidence. Here the order of emergence of the beads is again reversed, not because the beads had been pulled in reverse order, but because the tube was reversed. This kind of understanding, according to Piaget, is not attained until approximately the age of seven. Therefore, the prediction was that the hypnotic subjects should not be able to perform this task successfully at the experimental age of four, but should succeed at the experimental ages of seven and ten.

Question four at level four presumably tapped the mental operation with dealing with a 360° turn. The subject should understand that the complete turn of the tube through the 360° would not change the order of emergence back to its original order. According to Piaget's observations and theory, this operation is performed

successfully at about the age of seven. The prediction then was failure at age four and success at ages seven and ten for the hypnotic subjects.

Question five at level five required the subject to predict the emergence of the beads after the tube has been turned through fifteen 180° turns. Here was added an additional element to the original Piaget test. Piaget had asked the subject to predict the order of emergence, if the tube were to be turned around fifteen times. In the present study, the experimenter actually turned the tube around fifteen times while the subject watched. The prediction was that only the experimentally regressed subject at age ten should be able to solve this by some sort of tracking operation, i.e., keeping his eye fixed on one end of the tube, or by counting, i.e., "green is one, red is two, green is three, etc." A subject might be able to understand that alternate numbers represent the same bead, but may not yet understand the principle that "odd" represents the reverse order and "even" represents the original order.

Question six at level six required that the subject predict the order of emergence of the beads by imagining the experimenter had turned the tube through twenty 180° turns. In order to solve this problem, one of two methods had to be used: either counting, which is a rote method, or understanding that odd numbers represent the reverse order and even numbers the original order. If counting was used, the subject was rated at level five, but if the principle of odd and even was used, the subject was rated at level six. The prediction based on Piaget's assertion was that the regressed subject would not be able to achieve level six at any of the ages, ten, seven,

or four. If they achieved level six, this was rated as an adult achievement.

Figure 4 shows the key characteristic of each performance level and the age at which it is hypothesized that the successful solution is possible.

Performance level	Age level
1. Simple order	4
2. Simple reversal	4
3. 180° turn	7
4. 360° turn	7
5. 15 turns	10
6. Imagining 20 turns	above 10

Figure 4. Performance levels characteristic of each age level

The highest successful performance level reached by each of the simulating and regressed subjects at the three experimental age levels are shown in Table I. The figures represent the highest scored level achieved by each subject on this test at that particular age level. It should be remembered there are fifteen simulators divided into five for each age level, and there are five regressed subjects each one responding at all three age levels.

To evaluate the significance of the results rank biserial correlation coefficients were computed for the dichotomy simulating-regressed versus level of performance and were calculated separately for each age level. The subjects were ranked according to level of performance, the lowest level of performance being ranked first and

TABLE I

HIGHEST SCORED PERFORMANCE LEVEL REACHED
BY EACH SUBJECT ON THE HOLLOW TUBE TEST
AT DIFFERENT AGE LEVELS

Age 10 (Expected level: 5)		Age 7 (Expected levels:3,4)		Age 4 (Expected levels:1,2)	
Simulated	Regressed	Simulated	Regressed	Simulated	Regressed
6	5	6	3	6	0
5	4	6	4	2	2
5	5	6	1	0	3
6	5	6	1	6	1
6	2	6	2	5	2

the highest being ranked last.

For age ten, $Tau_b = .76$, P is $.05$, which indicates that the relationship between low performance level and the regressed condition could not be attributed to chance. For age seven, $Tau_b = 1.$, P is $.01$ also indicating a significant relationship between the low performance level and the regressed condition which could not be attributed to chance. For age four, $Tau_b = .48$, P is $> .10$ showing that the relationship between performance level and the regressed condition may be attributed to chance. It should also be noted that three of the five regressed subjects had a corresponding decrease of level of performance at each experimental age level. This was not true of any of the simulating subjects who tended to function at performance levels five and six at all three of the experimental ages. None of the simulating subjects had a corresponding consistent decrease in level of perform-

ance with decrease in experimental age.

In Table II the various performance levels are combined under the particular age group and show the number of simulators and the number of regressed subjects who functioned at that particular age level. The following should be considered concerning the apparent differences between simulating and regressed subjects. There were fifteen simulators divided into three groups, five for each level. In Table II the numbers under the simulator heading represent individual subjects. Since each regressed subject performed three times, once at each age level, the numbers under the regressed heading represent the number of times this experimental age level was attained by the five subjects. Thus, number eight under regressed, at age four, means that in all three experimental age conditions the regressed subject's performance approximated that of a four year old eight times.

TABLE II

NUMBER OF SUBJECTS WHO FUNCTIONED AT EACH
AGE LEVEL ON THE HOLLOW TUBE TEST

Age level	Simulators	Regressed
Adult	10	0
10	0	4
7	3	3
4	2	8

It should be noted that ten of the simulating subjects reached a performance level characteristic of the adult. This was not true of any of the regressed subjects.

2. Left and Right Test. This test was presented to both simulated and regressed subjects at ages ten and four. The test was analysed into five levels of performance. The first level is that in which the subject did not know his own left and right. Since the understanding of left and right from the child's own point of view develops, according to Piaget, at approximately age four, there was no prediction because the subject might or might not have reached such understanding at this age.

The second level is that in which the subject understands the meaning of his own left and right.

The third level is that in which the subject understands the position of objects from the point of view of his own left and right.

The fourth level is that in which the subject understands left and right of a person facing him (reversal).

The fifth level marks the point where the subject understands left and right of objects from the point of view of the person facing him.

The prediction was that at age four, the subjects would perform at levels one, two, or three; at age ten, subjects would perform at levels four or five.

Table III presents the level of performance of each subject at age four and at age ten. The simulated are different subjects at each age. The regressed are the same subjects at each age.

At the experimental age of four, $Tau_b = .56$, $P > .14$, and this relationship between low performance level and the regressed condition may be attributed to chance.

TABLE III
LEVEL OF PERFORMANCE OF EACH SUBJECT
ON THE LEFT AND RIGHT TEST
AT AGES FOUR AND TEN

Age 10 (Expected levels: 4,5)		Age 4 (Expected levels: 1,2,3)	
Simulated	Regressed	Simulated	Regressed
5	5	5	3
5	5	3	1
5	5	4	2
5	5	5	5
5	5	2	2

It can be seen at once that at age ten, all of the subjects passed the test at the highest level predicted. At age four, three out of five simulators functioned on a level above that age; only one regressed subject's performance was above the expected level. Fisher's (1941) direct method for the calculation of the probability of a set of observed frequencies in a four-fold contingency table was computed. P is .25 (not significant).

3. Arithmetic Test. The Arithmetic Test was given at ages ten and seven. It consisted of seven questions. The first two questions were introductory and were included to give the subject familiarity with the task. The discriminating questions were :

3. How much is 2 plus 2 minus 2?
4. How much is 4 plus 2 minus 2?
5. How much is 2 times 2 divided by 2?
6. Three little girls are given nine apples, how many will each have?

7. It takes twenty minutes to walk downtown, I can go twice as fast on a bicycle, how long will it take me to go downtown?

Regardless of the particular task, e.g., addition, subtraction, or division, there were six levels of performance possible.

Level one was that of complete failure on all the questions.

Level two was that in which the method of solution was concrete, such as using the fingers to count on.

Level three was that in which the method of solution was to deal with the problem by rote. For example, "Take two, and add two, then take two away," is dealing with the problem by rote.

Level four was that in which the subject verbalized the procedure involved in solving addition and subtraction. For example, "I added, then subtracted."

Level five was that in which the subject was able to solve a problem in division; and was able to say when asked how he did it, "I divided." If the subject correctly solved the problem in division, but did not use the principle of division, he was scored either at level three or level four, depending on the method used. For example, some subjects solved the problem of dividing 9 by 3 by stating, "I added three and three and three and got nine." This was scored at level four.

Level six required the use of the principle of cancellation. A response to the question, "How much is 2 plus 2 minus 2?" such as, "I just cancelled out the last two 2s," would be an example of this. This may be arrived at by understanding that the task consists of the adding and subtracting of the same number at the same time; and that this does not alter the given number. Therefore, these two operations cancel each other out and are superfluous so that no calculation is necessary.

Figure 5 shows the performance levels expected at each age.

Performance Level	Age Level
1. Failure	below 7
2. Concrete	7
3. Rote	7
4. Principle of addition & multiplication	10
5. Principle of division	10
6. Principle of cancellation.	Adult

Figure 5. Performance levels and predicted age of appearance

The prediction was that at age ten, the subjects would be able to solve all the problems and would use any of the principles except the principle of cancellation at level six. The principle of cancellation is usually understood above the age of ten. Children at age seven have not as yet learned division. If they solve problems involving division, it is usually by addition. And although they can add and multiply, they would ordinarily not be able to verbalize the principles of addition and multiplication. Consequently, the prediction was that at age seven, the regressed subjects would not perform higher than level three. The levels of performance for each subject at the respective ages of ten and seven are listed in Table IV. The simulators are different subjects at each age; the regressed are the same subjects at each age. As can be seen in Table IV, none of the regressed subjects performed at level six, the adult level. However, two simulators performed at the adult level.

TABLE IV

LEVEL OF PERFORMANCE FOR EACH SUBJECT ON ARITHMETIC TEST
AT AGES TEN AND SEVEN

Age 10 (Expected levels: 4,5)		Age 7 (Expected levels: 1,2,3)	
Simulator	Regressed	Simulator	Regressed
6	5	4	3
5	5	4	3
5	5	5	2
6	4	6	3
5	5	5	2

At age ten, $Tau_p = .52$ and P is $.14$. The relationship between low performance level and the regressed condition may be attributed to chance. Since we predicted success for all of the subjects at this age level, no significant relationship between performance level and the experimental condition was expected.

At age seven, none of the experimental subjects performed above level three, the highest level for this age. All of the simulators, however, exceeded the highest predicted performance level. $Tau_p = 1.$, P is $.01$. There was a relationship between lower level of performance and the regressed condition, which could not be attributed to chance.

Another distinguishing feature on this test, we thought, was the reaction time. Since children usually solve these problems by rote, the reaction time should be much longer than for those who are able to use the principle involved. Table V gives the total time in

in seconds it took each subject for all seven questions on the Arithmetic Test.

TABLE V
TOTAL TIME IN SECONDS PER SUBJECT
FOR ALL QUESTIONS ON
ARITHMETIC TEST

Age 10		Age 7	
Simulator	Regressed	Simulator	Regressed
9.5	12	4	14
17.5	62	8	45.5
7	19.5	4	52
3.5	38	6.5	37
6	19	15.5	65

For both age ten and age seven, $Tau_b = .92$, P is .02. The relationship between increase in reaction time and the regressed condition at both age levels could not be attributed to chance. Furthermore, three of the five simulators showed a decrease in total time as the experimental age level was lowered from ten to seven. It is unlikely that younger children should take less time on these problems. Three of the five regressed subjects showed an increase in total time with decrease in experimental age level. This is more in the direction of what might be expected with children.

4. The Clock Test. This test was given at ages seven and four. The development of the capacity to tell time was analysed into six levels. Figure 6 gives the performance levels and the corresponding ages at which these are expected to be operative.

Age	Performance Levels
4	<ol style="list-style-type: none"> 1. Unable to tell time at all. 2. Unable to read all the numbers.
7	<ol style="list-style-type: none"> 3. Can tell the hours only. 4. Can tell hours, half-hours, and quarter hours. 5. Can tell hours, half-hours, quarter hours, and all five and ten minute intervals, but not twenty and twenty-five minute intervals. 6. Can tell time correctly.

Figure 6. Performance levels in the development of the capacity to tell time at the corresponding age levels

As can be seen from Figure 6, it was predicted that children at the age of four would be, on the whole, unable to tell time. They might be able to read some of the numbers. In most cases, however, they would not be able to read the numbers at all. Springer (1952), who studied the development of the understanding of time and the clock in young children, found that, "The four year olds were not able to tell the times shown except for a few correct responses for eight and ten o'clock." (p. 86) She also found that less than one-third of the six year olds "indicated specifically an understanding that one hand is for minutes and the other for hours." (p. 86)

The performance of the subjects on the Clock Test was graded according to the highest level achieved. Table VI shows the performance level achieved by each subject in the two experimental conditions at ages seven and four. At age seven, $Tau_p = 1.$, P is .01, which indicates that the relationship between lower performance level and the regressed condition could not be attributed to chance.

TABLE VI

PERFORMANCE LEVEL OF EACH SUBJECT ON CLOCK TEST
AT AGES SEVEN AND FOUR

Age 7 (Expected levels: 3,4,5,6)		Age 4 (Expected levels: 1,2)	
Simulator	Regressed	Simulator	Regressed
6	5	6	1 ^d
6	4	3	1
6	3	1	1
6	4	3	1
6	3	1	1

At age four, $Tau_b = .60$, P is .10, and this not significant. Although here significant relationship between performance level and the repressed condition was not established, it is important to notice that none of the regressed subjects were able to tell time at all, while three of the simulator subjects did show some ability to tell time. One of these reached level six, the highest level.

Table VII presents the number of subjects reaching each particular level of development under the two experimental conditions and at the two different ages of seven and four. It will be noted here that among simulators at age seven, all five reached level six; whereas none of the regressed subjects attained that level.

TABLE VII
NUMBER OF SUBJECTS AT EACH PERFORMANCE LEVEL
ON THE CLOCK TEST

Performance Level	Age 7		Age 4	
	Simulator	Regressed	Simulator	Regressed
1			2	5
2				
3		2	2	
4		2		
5		1		
6	5		1	

5. Word Association Test. The Word Association Test was given in the waking state and at the ages of ten, seven, and four. The test consisted of two categories of words. The first category included those words for which there existed a criteria of response in the normal population. The second category included four words for which no such frequency criteria existed. It was hypothesized that these words would be beyond the normal vocabulary understanding level of children at ages four, seven, and ten. One of the words, "television," would have been so infrequently mentioned at the time the subjects were children that it could be said not to have existed for them. The frequency criteria shown in Table VIII were based on the Kent-Rosanoff (1910) tables for the most frequent responses out of one thousand adults. And for children, the criteria were taken from the Woodrow-Lowell tables of the most frequent responses from one thousand children.

TABLE VIII

MOST FREQUENT RESPONSE OF SIMULATING AND REGRESSED SUBJECTS
IN ALL CONDITIONS COMPARED WITH THE MOST FREQUENT
RESPONSE FROM THE KENT-ROSANOFF TABLES FOR
ADULTS AND THE WOODROW-LOWELL TABLES
FOR CHILDREN

Stimulus Word	Adults			Children	
	Kent- Rosanoff	Normal	Simulators	Woodrow- Lowell	Regressed Subject
<u>Table</u>	Chair	Chair	Chair	Eat	Chair
<u>Dark</u>	Light	Light	Light	Night	Night
<u>Man</u>	Woman	Woman	Woman	Work	Daddy
<u>Deep</u>	Shallow Water	Shallow Water	Shallow Water	Hole Water Well	Well
<u>Soft</u>	Hard	Hard	Hard	Pillow Bed	Bed Feather Mud Hard
<u>Mountain</u>	High Hill	Hill	Hill	High Hill	Snow
<u>Red</u>	Color Blue	White	Blue Green Black	Color	Crayon
<u>Hand</u>	Foot	Foot	Foot	Fingers	Fingers
<u>Soldier</u>	Man	Man	Man	War	Gun

Table VIII lists the most frequent responses from the Kent-Rosanoff and Woodrow-Lowell tables compared with the most frequent responses of the subjects under the various conditions. The control subjects in the normal adult and simulating conditions responded to eight out of nine stimulus words with either the first or second most frequent response listed in the Kent-Rosanoff tables. The responses of the regressed subjects were in six out of nine cases equivalent or identical with the responses listed in the Woodrow-Lowell tables for children, and only one adult response occurs most frequently.

The four specially selected words, which we thought would result in failure because they would be beyond the knowledge of the subjects at the time they were children, are listed in Table IX.

TABLE IX
MOST FREQUENT RESPONSE OF SUBJECTS
TO FOUR SPECIALLY SELECTED WORDS

Stimulus Word	Responses		
	Normal (adult)	Simulator (all ages)	Regressed (all ages)
<u>Myth</u>	Fable	Failure	Failure
<u>Penis</u>	Man	Failure	Failure
<u>Vagina</u>	Woman	Failure	Failure
<u>Television</u>	Radio	Radio	Failure

This Table presents the most frequent responses of the control subjects during the normal adult and simulating conditions, as well as the experimentally regressed subjects' most frequent responses.

The most frequent response of the regressed subjects was a failure to all of the specially selected words. Among the control simulators, the most frequent response was failure for the first three words, but the most frequent response to the word, "television", which could not have possibly existed at the time they were children, was "radio."

The Kent-Rosanoff and the Woodrow-Lowell tables have developed different methods of analyzing the types of associative response. It was felt that the essence of their analysis could be expressed in two categories: (1) Adults tend to give responses which are more abstract, and (2) Children tend to be concrete in their response. Children's concretism may be expressed in either functional or situational responses. Woodworth (1938) points out that children tend to give a response which "stays with" the word. "Staying with" a word appears to resemble closely the type of response given by young children to the Stanford-Binet Vocabulary test. Such responses are usually scored on the basis of their tendency to be concrete in a functional sense or concrete from a situational point of view.

For this reason it was felt that an analysis of the number of concrete and abstract responses given by each subject would give a fairly good indication of whether or not his direction of thought in word association corresponded to that found in children. While there are no norms for the particular age levels, it was predicted that a decline in abstract responses and an increase in concrete responses at each lower age level would be shown.

All of the responses given by all of the subjects were rated abstract or concrete by three raters. The raters were given the instructions that if the response to a stimulus word consisted of the following types of responses, they were to be rated as abstract:

1. Opposite: dark-light
2. Superordinate: red-color
3. Part-whole: hand-arm
4. Coordinate: table-chair

The raters were further instructed that if the responses consisted of the following types of responses, they were to be rated as concrete:

1. Functional: table-eat
2. Situational: soft-bed
3. Whole-part: hand-fingers

The raters were also given the general instructions that words which transcended the scope of meaning of the original stimulus word were to be rated as abstract and words that "stayed with" the original stimulus word in meaning were to be rated as concrete. The rather rigorous criterion was adopted that only those responses were scored on which there was complete agreement with the experimenter by all three raters. A percentage of abstractness was then calculated for each subject which consisted of the number of abstract words over the total of abstract plus concrete words on each particular test. Of a total of one hundred and eighty six words there was complete agreement with the experimenter by all three raters on one hundred and eleven.

Table X presents the percentages of abstract responses of the control and experimental subjects in the waking condition.

TABLE X

PERCENTAGE OF ABSTRACT RESPONSES ON WORD ASSOCIATION TEST
OF CONTROL AND EXPERIMENTAL SUBJECTS
IN THE WAKING CONDITION

Controls		Experimental	
Subject	Per cent	Subject	Per cent
I	100	A	78
II	78	B	90
III	90	C	71
IV	100	D	80
V	90	E	100
VI	82		
VII	57		
VIII	100		
IX	100		
X	80		
XI	80		
XII	100		
XIII	82		
XIV	100		
XV	61		

According to the prediction, abstract responses should predominate here with no significant difference between the control and experimental subjects. The t test reveals $t = .07$, $P > .90$ (18 degrees of freedom) which indicates that there was no significant difference between the control and experimental subjects in the waking condition insofar as this test is concerned. Since all of the percentages are over fifty per cent, the predominance of abstract words in the adult state is clearly established.

Table XI shows the percentage of abstract words for each of the experimental subjects at ages ten, seven, and four.

TABLE XI
PERCENTAGE OF ABSTRACT WORDS FOR EACH
EXPERIMENTAL SUBJECT REGRESSED
TO TEN, SEVEN, AND FOUR

Subject	Regressed Age 10	Regressed Age 7	Regressed Age 4
A	40	25	0
B	71	50	33
C	25	0	0
D	50	0	25
E	75	57	22

A summary of the analysis of variance for this table is given in Table XII and reveals that there is a significant difference between the three ages insofar as percentage of abstract responses given by the regressed subjects is concerned. $P < .05$, (8 and 4 degrees of freedom).

TABLE XII
SUMMARY OF ANALYSIS OF VARIANCE FOR PERCENTAGE OF ABSTRACT
RESPONSES OF REGRESSED SUBJECTS AT THREE AGE LEVELS

Source of variation	Sum of Squares	df	Mean square	F
Between Rows	4386	2	2193	14.7
Between Columns	3473	4	868	5.82
Residual (error)	1189	8	149	
Total	9048	14		

Table XIII gives the same information for each of the control subjects simulating ages ten, seven, and four.

TABLE XIII
PERCENTAGE OF ABSTRACT WORDS FOR EACH CONTROL
SUBJECT SIMULATING AGES TEN, SEVEN, & FOUR

Age 10	Age 7	Age 4
83	43	83
50	92	67
100	92	14
92	87	87
82	100	50

The summary of the analysis of variance for the control subjects is given in Table XIV and reveals there is no significant difference between the three ages, $P > .05$ (12 and 2 df.).

TABLE XIV
SUMMARY OF ANALYSIS OF VARIANCE FOR ABSTRACT
RESPONSES OF SIMULATING SUBJECTS AT
THREE AGE LEVELS

Source of variation	Sum of squares	df	Mean square	F
Between	1603	2	802	1.368
Within	7038	12	586	

Since an F of 3.59 would be required for significance at the

.05 point we can conclude that insofar as the percentage of abstract words is concerned, the experimental subjects performed significantly differently at the three age levels while the simulating subjects did not.

Table XV presents a comparison of the percentages of abstract words between simulating controls and experimentally regressed subjects at the three age levels.

TABLE XV

COMPARISON OF PERCENTAGES OF ABSTRACT WORDS BETWEEN SIMULATING AND REGRESSED SUBJECTS AT ALL THREE EXPERIMENTAL AGES

Age 10		Age 7		Age 4	
Simulating	Regressed	Simulating	Regressed	Simulating	Regressed
83	40	43	25	83	0
50	71	92	50	67	33
100	25	92	0	14	0
92	50	87	0	87	25
82	75	100	57	50	22

At age ten $T_{ab} = .80$, P is .05. At age seven $T_{ab} = .84$, P is .03. And at age four, $T_{ab} = .76$, P is .05. It can be seen that at each age level there is a relationship between lower percentage of abstract words and the regressed condition which could not be attributed to chance.

6. Mud and Lollipop Test. Because of conditions beyond our control, this test was only given to four of five experimental subjects. The test was given to five controls simulating age four. Excerpts follow from the observer's record of their performance when the experimenter handed them a lollipop after they had been playing in the mud.

Control subjects

Subject 1. When the experimenter offered the subject the lollipop, the subject looked at the experimenter and said, 'Where do I clean my hands?' wholly disregarding the lollipop.

Subject 2. Experimenter told subject because she was a good little girl, he was giving her a sucker. Subject looked at her hands disdainfully and said, 'I have to wash my hands.' She went to the bathroom, washed her hands, and returned and told the experimenter that she loved suckers dearly at four.

Experimental subjects

Subject A. The experimenter offered the subject a lollipop. The subject said, 'Shall I eat it?' The experimenter replied, 'Whatever you like.' The subject immediately took the paper off the lollipop and put it in her mouth. The subject said, 'I like grape pop.' The experimenter suggested returning to the experimental room. The subject was brought back to her present adult level of age nineteen. When she opened her eyes, the experimenter asked, 'How old are you?' The subject replied, 'Nineteen,' then looked at her hands and exclaimed, 'Where did I get such dirty hands? My goodness. Eating a sucker with such dirty hands. What have I been doing?'

Subject B. The subject took the sucker and looked at it, also looking down at her hands. She gingerly took the paper off the sucker and put the sucker in her mouth and gave the paper to the experimenter. She brushed the sand from her hands. The experimenter suggested returning to the experimental room. The subject was given the suggestion to close her eyes and was then brought back to her present chronological age of twenty-one. The subject looked at her hands and brushed her hands together and said, 'I've got something in my eye.' Subject looked at her hands and laughed and said, 'It's all over my hands.' She appeared extremely uncomfortable.

The prediction was that the experimental subjects would accept the lollipop, even though their hands were dirty, but when they were brought back to their present chronological age, they would express disgust or discomfort about their dirty hands and particularly about eating a lollipop in that condition. All of the experimental subjects accepted the lollipop, seemingly enjoyed it and paid no attention to their dirty hands. Four of

the five control subjects insisted on washing their hands before they would eat the lollipop.

TABLE XVI

NUMBER OF EXPERIMENTAL AND CONTROL SUBJECTS
WHO WASHED AND NUMBER WHO DID NOT WASH IN EACH GROUP

	<u>WASHED HANDS</u>	<u>DID NOT WASH HANDS</u>
REGRESSED	0	4
SIMULATORS	4	1

Table XVI shows the number of subjects in each group who washed their hands as well as the number of subjects who did not wash their hands. Fisher's direct method (2 x 2 table) was used to calculate the probability. P is .04 and is significant.

7. Summary of Statistical Findings. Table XVII is a summary of the statistical findings on all the cognitive and emotional tasks in the experiment. The statistical test, the probability, and whether or not the finding is significant (S) or not significant (NS) is given. In addition, along with each probability, we have listed whether the finding is in accordance with the prediction made it is marked (IP).

Of the four statistical tests in the experimental age ten all are in the predicted direction. All six of the statistical findings at the experimental age seven agree with the predictions made. The results of two of the five statistical tests at age four also correspond with the prediction made. Age four is the only

experimental age in which statistical findings do not all agree with the predictions.

TABLE XVII
SUMMARY OF STATISTICAL FINDINGS ON
COGNITIVE AND EMOTIONAL TASKS

Test	Age 10	Age 7	Age 4
Hollow Tube	$Tau_b = .76$ \underline{P} is .05 (S) P	$Tau_b = 1.$ \underline{P} is .01 (S) P	$Tau_b = .48$ $\underline{P} > .10$ (NS)
Left and Right		$Tau_b = 0$ (NS) P	$Tau_b = .56$ $\underline{P} > .11$ (NS)
Arithmetic			
a. Level	$Tau_b = .52$ \underline{P} is .11 (NS) P	$Tau_b = 1.$ \underline{P} is .01 (S) P	
b. Time	$Tau_b = .92$ \underline{P} is .02 (S) P	$Tau_b = .92$ \underline{P} is .02 (S) P	
Clock		$Tau_b = 1.$ \underline{P} is .01	$Tau_b = .60$ \underline{P} is .10 (NS)
Word Assoc.	$Tau_b = .80$ \underline{P} is .05 (S) P	$Tau_b = .84$ \underline{P} is .03 (S) P	$Tau_b = .76$ \underline{P} is .05 (S) P
Mud & Lollipop			\underline{P} is .04 (S) P

C. Quantitative Analysis of Contextual Recall

1. Questionnaire. The questionnaire was presented to all of the controls and the experimental subjects in the waking condition. It was also presented to the controls simulating age ten and seven, and to the experimental subjects at ages ten and seven. In addition to some necessary information about the subject which was required for the records of the experiment, the questionnaire contained seven specific memories relating to the period when the subject was in the second grade. All of the questions, however, were not equally discriminating for the various experimental conditions. For example, the question asking what subjects were studied in the second and fifth grades was answered by almost all of the subjects in the waking condition. Most of them, however, said later that this was not a recollection but that they "figured out" what they probably would have studied at that time.

An objective validation of the answers that the subjects gave us was attempted. But a complete validation was impossible. Under these conditions it was felt that unless evidence was found that the answer was not correct, it would be scored as a creditable response.

If the subject gave an answer which was later objectively found to be incorrect, it was scored as incorrect. If the subject informed the experimenter that he had fabulized and had simply made up answers, these answers were also scored as incorrect. All other answers were accepted as valid.

Table XVIII compares the percentages of the number of correct memories in the waking state between the fifteen control subjects and the five experimental subjects. The t test shows no significant difference between the two groups, t = .69, P is .50 for 18 degrees of freedom.

TABLE XVIII

COMPARISON OF PERCENT OF CORRECT MEMORIES IN THE
WAKING STATE BETWEEN FIFTEEN CONTROL AND FIVE
EXPERIMENTAL SUBJECTS

CONTROLS	EXPERIMENTAL SUBJECTS
21	14
36	14
29	21
0	57
50	29
50	
71	
21	
14	
7	
29	
43	
29	
50	
43	

TABLE XIX

COMPARISON OF PER CENT OF CORRECT MEMORIES BETWEEN
CONTROL SUBJECTS SIMULATING AGE TEN
AND EXPERIMENTAL SUBJECTS
REGRESSED TO AGE TEN

Simulators	Regressed
29	57
50	57
21	86
50	71
50	64

Table XVIII presents a comparison of the percentage of the correct memories between the control subjects simulating age ten and experimental subjects regressed to age ten.

Table XIX presents the same comparison for simulators at age seven and control subjects regressed to age seven. Tau_b was calculated for both of these tables. For Table XIX $Tau_b = 1.$, P is .01. For Table XX $Tau_b = 1.$, P is .01. At both the ages of seven and ten there was a relationship between the improvement of memory and the regressed state, which could not be attributed to chance.

TABLE XX

COMPARISON OF PER CENT OF CORRECT MEMORIES BETWEEN
CONTROL SUBJECTS SIMULATING AGE SEVEN
AND EXPERIMENTAL SUBJECTS
REGRESSED TO AGE
SEVEN

Simulators	Regressed
43	86
29	86
14	100
14	100
57	100

The percentage scores of memories given by the control subjects when simulating were compared with those given by the same subjects in the adult waking state. The results are presented in Table XXI. To test whether their performance differed significantly, a t test for matched groups was calculated. For the comparison of simulating age ten with adult waking, t = 1.72, P > .10, for 4 degrees of freedom (not significant). For the age seven comparison with the adult waking group t = .64, P is .55 for 4 degrees of freedom (not significant). Thus, there was no significant improvement in memory in the control subjects in the simulating condition.

TABLE XXI

COMPARISON OF PER CENT OF CORRECT MEMORIES
GIVEN BY CONTROL SUBJECTS IN THE ADULT
WAKING STATE AND WHEN SIMULATING AGES
TEN AND SEVEN

Subject	Adult Waking	Simulating Age 10	Subject	Adult Waking	Simulating Age 7
III	29	29	II	43	43
VI	50	50	V	43	29
IX	14	21	VIII	0	14
XIV	50	50	XII	29	14
XV	43	50	XIII	0	57

Next we made a similar comparison with our regressed subjects, comparing the percentage scores of memories in the adult waking state and the percentage scores of memories in the regressed state. These are presented in Table XXII. Both of these comparisons were found to be highly significant. For the age ten comparison with the adult waking state, $t = 4.89$, $P < .01$, for 4 degrees of freedom. For the age seven comparison with the adult waking state, $t = 13.4$, $P < .01$ for 4 degrees of freedom.

TABLE XXII

COMPARISON OF PERCENT OF CORRECT MEMORIES GIVEN BY EXPERIMENTAL
SUBJECTS IN THE ADULT WAKING STATE AND WHEN REGRESSED
TO AGES TEN AND SEVEN

Subject	Age 10		Age 7	
	Adult waking	Regressed	Adult waking	Regressed
A	14	57	0	86
B	14	57	0	86
C	21	86	14	100
D	57	71	43	100
E	29	64	29	100

Table XXIII presents a comparison between the percent of correct memories in the experimental subjects in the adult waking and in the adult somnambulist state

TABLE XXIII

COMPARISON OF PERCENT OF CORRECT MEMORIES IN EXPERIMENTAL
SUBJECTS BETWEEN ADULT WAKING AND SOMNAMBULIST STATE

Subject	Adult waking	Somnambulist
A	14	21
B	14	43
C	21	71
D	57	86
E	29	29

There was no significant difference between these two conditions. $t = .259$, $P > .05$, 4 degrees of freedom. Thus from Tables XX and XXI it can be seen that there was a statistically significant difference in the improvement of memory in the experimental subjects in the regressed state at both age ten and seven. There was no significant improvement in memory in the simulators. While four out of five experimental subjects do show an improvement in memory in the somnambulist state, this improvement was not statistically significant.

2. Pledge of Allegiance Test. This test was given at ages ten and seven under simulating and regressed conditions. The predictions on this test were: (1) that few children at the age of seven would be able to write the Pledge of Allegiance; (2) that improper wording would be evidenced by some of our experimental subjects at age ten.

The difference between a substitution and what was called improper wording can be explained as follows: If the subject substituted one word for another without essentially changing the meaning of the Pledge, this was called a substitution. If, however, a word was used which changed the meaning of the Pledge or made no meaning whatsoever this was called improper wording. An example of substitute is the word "for" instead of "with" in "liberty and justice for all." An example of improper wording is "one nation invisible."

Table XXIV shows all the types of errors and the number of such errors made by each of the subjects in each of these

experimental conditions. Inspection of this Table concerning our predictions reveals the following: (1) None of the regressed subjects could write the Pledge at age seven. (2) All of the five simulating subjects wrote the Pledge, one of these, however, did not complete it. (3) As was predicted, improper wording occurred in the regressed subjects in the age ten period by two of the subjects. None of the simulating subjects used improper wording.

TABLE XXIV

TYPE AND FREQUENCY OF ALL ERRORS MADE BY EACH
SUBJECT IN THE SIMULATED AND REGRESSED
CONDITION AT THE EXPERIMENTAL AGES
OF TEN AND SEVEN

S	Age 10		Age 7	
	Simulation	Regression	Simulation	Regression
1	Incomplete Misspelled (1)	Incomplete Improper (1) Omitted (4)	Substitute (1)	Can't write
2	Misspelled (1)	Misspelled (2) Improper (1)	Misspelled (4) Substitute (1)	Can't write
3	Incomplete	Misspelled (1)	Incomplete Misspelled (1)	Can't write
4	Omitted (6)	Misspelled (1)	No error	Can't write
5	No error	Misspelled (2)	Misspelled (3)	Can't write

Table XXV shows the number of subjects who could and the number of subjects who could not write the Pledge in the control and the experimental groups. Fisher's direct method of calculating probabilities showed that P is .01 (significant).

TABLE XXV

NUMBER OF SUBJECTS WHO COULD AND COULD NOT WRITE
THE PLEDGE AT AGE SEVEN IN CONTROL
AND EXPERIMENTAL GROUPS

	Could Write	Could Not Write
Regressed	0	5
Simulating	5	0

3. Individual contextual recall. The experimenter received a sealed package from one of the subject's parents which contained some textbooks from the second grade, a scrap-book with several drawings, and other material, all of which dated back to the period during which the subject was in the second and fifth grade. As far as could be determined, the subject was not aware of the contents. The parents had saved this material. The experimenter examined the package and selected a music book about which he questioned the subject in the waking state before the subject was regressed. The following are the verbatim excerpts from the transcript:

Waking state

- E. "Do you remember the name of the Music Books which you studied from when you were a child?"
S. "Yeah."

E. "Which one do you remember?"
 S. "Oh, well, I remember not just one."
 E. "What do you remember?"
 S. "Oh, they had something on the front. And they were green with black letters and they had little pictures above the songs."
 E. "Do you remember any of the songs?"
 S. "No."
 E. "Do you remember your second music book?"
 S. "Oh, sort of."
 E. "What grade was that in?"
 S. "Second."
 E. "Do you remember any of the songs?"
 S. "No."
 E. "What was the name of the music book?"
 S. "Song Book Number Two, I think."

The subject was questioned again when he was regressed to seven.

The following is the verbatim transcript:

Subject regressed to age seven

E. "Do you have a music book?"
 S. "Yes."
 E. "What's the name of it?"
 S. "You mean what does it say?"
 E. "Yes."
 S. "Book Two."
 E. "What else does it say?"
 S. "It has a picture of a girl in front."
 E. "What kind of a girl?"
 S. No answer.
 E. "Well, what else does it say?"
 S. "I don't know."
 E. "Do you remember any of the songs that you are singing from it now?"
 S. "Oh, well, we sing ---I don't know---. We are singing "My Country 'Tis of Thee.""
 E. "Any other songs?"
 S. "We're singing about the butterfly."
 E. "What about the Butterfly? Can you tell me the words?"
 S. "(Singing) "Butterfly on painted wings. S stopped singing. "I know what page it's on. It's on page 8."
 E. "It's on page 8?"
 S. "Tomorrow, teacher is going to ask us what songs we want to sing and I'll tell her it's on page 8."
 E. "Do you know any more of the song?"
 S. "No, my child, I'm glad to be

Just what God intended me.
So I fly from flower to flower
Making bright each summer hour."

E. "Is that the first verse?"

S. "I don't know."

E. "Anything else?"

S. "I can't remember how it ends."

After the subject was awakened, he was questioned about the song. The following is an excerpt from the verbatim transcript:

Post-hypnotic

E. "Do you remember a song you used to sing in school about a butterfly?"

S. "I think so, vaguely."

E. "Do you remember the words?"

S. "I remember the title of it."

E. "What's the title of it?"

S. "All I can think of is "Poor Butterfly" and that's a popular tune."

The music book referred to is titled "The Music Hour Second Book," published by the State of Kansas, Topeka, 1930. On the cover of the book there are three figures, a Dutch girl, an American boy and a Chinese boy. The cover is green with black letters. The text consists of songs illustrated with pictures above them. The color of the cover and lettering was remembered in the waking state. The girl was mentioned as "something on the front" in the waking state and later in the regressed state was specifically recalled. On page 8 the song, "Butterfly on Painted Wing" appears. The words are as follows:

Butterfly on painted wing
Don't you wish that you could sing?
Don't you wish that you could fly
Like a bird up to the sky?

No my child, I'm glad to be
Just what God intended me
So I fly from flower to flower
Making bright each summer hour.

It will be noticed that the subject had no remembrance of this song, and it seemed most dramatic to the experimenter that after a lapse of fourteen years, the memory of the page number as well as most of the words of this song was available.

D. Attempted Objective Validation of the Regressed Subject's Memory Data

An attempt was made to objectively verify the memories given by the subjects at the regressed ages. The individual student records, on file at the Administration Records Office, Board of Education, Topeka, Kansas, were searched and the following data was checked for each experimental subject:

- (1) grade school and year subject attended;
- (2) second grade teacher's name;
- (3) fifth grade teacher's name;
- (4) fellow pupils in particular class.

Since it was impossible to check the seating arrangements of any class fourteen years ago, if the record showed that the name of the pupil mentioned was listed in the same class as the subject, we considered the data verified.

Subject A. Only the fifth grade of this subject could be checked since that was when she entered the Topeka school system. The date of her entry into the Topeka school system, the teacher's name and the name of the two other fellow students were verified by the records of the Topeka Board of Education Administration, Census Department.

Subject B. In the second grade the subject was listed as

having a teacher other than the one she listed. However, the teacher listed was also a second grade teacher in the same school and in the same year. In trying to track down the reason for the subject giving a different teacher's name from that shown in the records, the subject's mother was contacted and questioned. The mother claimed she remembers that when the subject was in the second grade, the class was overcrowded, and the class was split up. The subject had the teacher she listed at first, but was later transferred to the class of the teacher given by the school records. This seemed to be quite plausible in view of the fact that both teachers were in the records as second grade teachers.

The records showed that one of the classmates mentioned by this subject had the same teacher as the subject. No record could be found of the name of the other pupil mentioned. Since the subject had no recollection about these two pupils in the waking state, there was no way of checking on the spelling of the name. The records are filed according to pupil's names and unless we had the correct spelling there was no way to check on them.

The fifth grade teacher was verified by the records. One of the two pupils listed was also verified. The second pupil's record showed a different teacher, but she was in the same school, same grade, in the same year. Upon later questioning, the subject said she remembered that one pupil sat behind her for part of the time and was later transferred to another class.

Subject C. The second grade teacher and the two second grade classmates were verified by the records. The fifth grade teacher's name and one of the fifth grade classmates was also verified but

no record of the other fifth grader mentioned was found. There was no opportunity to check with the subject on the spelling of the name of this student. It may be that we were unable to verify this because of the incorrect spelling of the name.

Subject D. The administration records indicated that the subject had a second grade teacher other than the one listed by the subject. However, the teacher named by the subject was his first grade teacher according to the records. A careful check of the protocols showed that the subject's seventh birthday to which he was regressed when giving this information fell during the summer vacation before he was in the second grade. Therefore, it was more accurate for him to respond to the question, "Who is your teacher now?" with the name of his first grade teacher.

The two pupils mentioned as having been in the same class as the subject were also found to have been in the same first grade class with the subject.

The subject's fifth grade teacher was also verified by the records. Only one classmate was listed by the subject because he claimed no one sat behind him. The records verified this pupil as having been in the same class.

Subject E. The school, the dates attended, the second grade teacher, and the two classmates at second grade level were all verified by the administration records.

The fifth grade teacher and one of the classmates was verified. There was no record of the other fellow student.

Table XXVI presents a summary of the data and lists what has a; been validated (V), b; what was partially validated (V?), and c; that which could not be validated (NV).

TABLE XXVI
SUMMARY OF OBJECTIVELY VALIDATED MEMORIES OF
THE FIVE EXPERIMENTAL SUBJECTS

Subject	Year and school	2nd grade teacher	2nd grade classmates	5th grade teacher	5th grade classmates
A	V			V	2V
B	V	V?	1V 1NV	V	1V 1V?
C	V	V	2V	V	11V 1NV
D	V	V	2V	V	1V
E	V	V	2V	V	1V 1NV

Of the seventeen classmates listed by the subjects, thirteen could be demonstrated as having been in the same class with the subject, one appears likely, and no record could be found of the other three. Of the nine teachers mentioned, eight were validated by the administration records and one was validated by the subject's parents.

E. Some Qualitative Observations

The difficulties of making a qualitative analysis of all the contents, observations and recordings which filled several hundred pages, are apparent. The data which were most readily accessible for statistical analysis have already been presented in the previous section on quantitative analysis. Primarily, the comparisons between experimental and control subjects were organized on the basis of the performance of the subjects at various age levels. It must be re-emphasized that an inherent characteristic of performance analysis is that it requires a qualitative rather than a quantitative approach. Such statistical analysis as has already been presented was based on a qualitative analysis of the results and then these judgments analyzed.

In this section our aim will be to make some qualitative comments on the experimental tasks and situations giving samples of behavior to illustrate the points made.

All of the subjects were given a ten minute period of free play in the playroom, to help them acclimate themselves to the particular age at which they were to be functioning. The behavior of the simulators and the regressed subjects were remarkably different during this period. Five out of the fifteen simulators appeared to be fairly comfortable playing with the toys and to some extent even enjoying themselves. The other ten, however, were obviously embarrassed and uncomfortable. There was a marked difference in the behavioral attitude of the two groups from the moment they entered the playroom. Even the way they entered the

playroom was different. The simulators entered hesitantly. Most of them looked around for several minutes and did not seem to know what to do. They appeared to be at a loss to know what toys to play with. On the other hand, when the regressed subjects entered the playroom, they expressed pleasant surprise at the toys, did not seem embarrassed or uncomfortable and decided without too much hesitation upon the toys with which they wanted to play. They inspected the toys in the playroom with interest and anticipation. The simulators, on the other hand, would pick up one toy after another, give each a cursory inspection and put it down again. It seemed to be difficult for them to find anything to show interest in. By the time half of the free play period was over, most of the simulators, however, finally settled down to one particular play activity and stayed with it until the end of the free play period.

There was a marked difference in the physical behavior of the two groups. One interesting observation was the lack of bodily movements and of locomotion apparent in all of the simulators. Most of them remained in one corner of the room and inspected the toys. After they had selected a particular toy to play with, they would sit on a chair or on the floor and remain in the same corner of the room until the free play period was over. Our regressed subjects, on the other hand, moved back and forth across the room freely. It was interesting to see a simulator picking up one toy after another with one hand and then replacing it, all the while keeping the other hand in his pocket. None of our regressed subjects did this. They approached the toys eagerly with both hands and inspected them with

more interest.

Another difference was the change in the quality of the voice of the experimental subjects. Only two of the fifteen simulators made any attempt to imitate the voice of children, although they were specifically instructed to talk like a ten-year-old when they were in the playroom. All of our experimental subjects' voices changed in pitch, intonation and tempo at each age level, as well as their enunciation and articulation of speech.

With the exception of two simulators, none of the control subjects interacted socially with the experimenter until the experimenter asked them to perform certain tasks. The regressed subjects continually interacted with the experimenter during the free play period. Sometimes they asked questions about the toys, at other times they asked him to participate in the play.

The degree of the constructiveness of play among the simulators was either very high or very low. There was no apparent gradual increase of constructiveness with increase of age level. At all ages the simulators acted in either one of two ways, either they indiscriminately picked up one toy after another and then laid it down, or they selected toys and constructed complicated and highly organized games. For example, several of the simulators built forts and played soldiers. The highly organized character of these constructions was remarkable in that they more closely resembled the schematic diagrams of an ROTC problem, rather than the constructive play of a child.

Several of the simulators picked up toy guns in the playroom and pulled the trigger, but only two of them actually made any sound

with their voices imitating the sound of a gun firing. Most young children when they pull the trigger of a gun will imitate the sound of firing.

Many of the control subjects found it difficult to maintain their role during the period in the playroom. Several times, either during the free play period, or during the actual presentation of the tasks, they stepped out of their role to make some side remark to the examiner.

One subject among our simulators found it impossible to maintain the role during the free play period and simply sat down for a few minutes explaining to the examiner how difficult it was to pretend to be a child of four. The examiner reminded the subject of the instructions and asked for her further cooperation. However, the subject simply sat in the chair and gazed around the playroom, waiting until the free play period was over.

On the other hand, the regressed subjects were more consistently convincing during the free play period and during the presentation of the tasks. The experimenter was impressed with the apparent spontaneity and lack of self consciousness with which the subjects behaved at the respective age levels. Regardless of the level of their objective performance, the experimentally regressed subjects gave the observer the distinct impression that the subjects emotionally believed themselves to be at the particular level of age regression. They seemed to accept this regression so completely that few, if any of the problems that the simulators were confronted by during the free play period and the presentation

of the tasks seemed to arise for the experimental group.

The behavior of the regressed subjects generally appeared to be more spontaneous. When the questions became difficult they reacted as a child would when faced with difficult questions. They either hesitated, looked puzzled, or freely said, "I don't know." They were not apologetic when they failed. As a rule the simulators seemed uncomfortable or embarrassed even when they pretended to fail a particular question. With three possible exceptions, all simulators were unconvincing in their role playing during the testing situations. The regressed subjects seemed remarkably genuine and at ease. Some even spontaneously commented childlike, "This is fun."

The Word Association Test was particularly troublesome for the simulators and they appeared very conscious of not knowing how to perform as a child on this test. Several subjects remarked that they only realized later they should not have responded at all to the word "television". The simulators also had difficulty with the word "penis" and "vagina", evidenced by exceptionally longer reaction times.

The regressed subjects, on the other hand, did not show any particularly long reaction time for these two words. The most frequent response being, "I don't know that word."

The Arithmetic Test provided many interesting examples of the qualitative difference of responses. Though two subjects may achieve the solution of a problem, their performance may be mediated through entirely different processes and therefore occur on different

levels. For example, it was typical of the simulators to say, "I added 2 and 2, and subtracted 2." Three out of five regressed subjects responded on this same question with, "Well, 2 and 2 are 4. You take 2 away and you only have 2 left."

There is an important cognitive distinction between these two forms of solution. The use of the words "add" and "subtract" imply a symbolic development beyond the word "and" and the words "take away from." The average child of seven, when he adds, simply says, "and." When he subtracts, he says, "take away from." This is just one example of many more qualitative differences that were detected at the various performance levels in the Arithmetic Test and translated into quantitative scores.

Another interesting observation among the regressed subjects at age seven is their response to questions five, six, and seven. Each of these questions normally involves the knowledge of the principles of division. Three of the regressed subjects passed question six, "Three little girls are given nine apples. How many will each have?" The process, however, that led here to success is noteworthy. The following quotation from one of the three subjects is typical. "Can you add and get it? Three and three is six, and three is nine. They have three." The subject solved the problem but did not use the principle of division. When one of the subjects was asked, why he added three 3's, he answered, "Well, there were three girls."

The explanation of this finding is certain difficult. There are several possibilities. One can, of course, try to explain it

by saying that this is a clever subterfuge which the regressed subject uses to comply with the request of the hypnotist to solve a problem which he "knows" to be beyond a seven year old's mastery. This does not seem to be a satisfactory explanation, however, because such subterfuges were not used on many other problems that were plainly failed (e.g., "I don't know," etc.). It seems unreasonable to assume that the cooperative subjects would use subterfuge on this one problem alone. Another more acceptable explanation may be that children of this age may evolve such more primitive methods for solving division problems. Scheerer, Rothmann, and Goldstein (1945) have pointed out, for example, that complex, overtaxing tasks are often approached by reducing them to successive steps which might be individually tackled even though the total task seemed overwhelming.

On the Clock Test one of the simulators read the small hand only. He was quite introspective about this assumed inability and tried to explain it by saying, "I can only count the small hand." It is doubtful that a child of four could be quite so introspective about his inability to tell time. If one contrasts this with the behavior of one of the subjects regressed to age seven, who also only read the small hand, an interesting qualitative difference will be noted. The regressed subject asked, "Is that supposed to be the little hand?" This remark was not introspective. Piaget (1952b) noted that it is only after the age of seven that the child begins to develop the ability to be introspective about his own thought processes.

Assuming for a moment the simulators could not gauge correctly the specific age at which they should or should not be able to tell time, could they nevertheless approximate the type of errors a child makes? Since none of the regressed subjects could tell time at age four, it may be fruitful to analyze the qualitative difference between the errors made by the regressed subjects at age seven and the simulators at age four. Most errors of the simulators at age four consisted of reading the small hand only. They were quite definite about this. They responded with, "two o'clock," "three o'clock," etc. The regressed subjects at age seven who read the small hand only were neither as certain, nor as precise as the simulators. Typically they responded with, "about" one o'clock or "about" half past three. Moreover, one of the regressed subjects confused the direction of the rotation on the clock which no simulator did. This appears to be an error quite likely characteristic of a child of that age. In struggling with this uncertainty of direction on the clock, the subject exclaimed, "I can't tell if it's before or after three o'clock." Though it may appear a subtle difference, this regressed subject did not explain his difficulty.

On the Word Association Test it was found that the regressed subjects tended to become increasingly more concrete with the decrease in age level. The simulators, in contrast, tended to change their responses very little. A rather typical example of this contrast is the following: To the stimulus word "man," the

simulating subject's response was "woman" in both the adult state and when simulating age four. The regressed subject's response was "woman" in the waking state; "dad" at age ten; "When I grow up" at age seven; and "daddy" at age four.

The word "dad" retained its meaning but changed from in concordance with the younger age level. At age seven even the meaning changes and the response to "man" was "When I grow up."

In order to illustrate the difference in the quality of the responses, we have selected a sample protocol from one of the simulating subjects and one of the regressed subjects. We have selected these examples at the age four level because at this level we would expect the differences from the adult responses to be most extreme. It should be noted that to the stimulus word "table," "dark," "man," and "mountain," the simulators responded with the same respective words they gave in the adult normal state, when they acted the four year level. Among the regressed subjects, there were no such repetitions. While it is true, that one must take into consideration the personal characteristics of the subject giving the response. Still if we examine the responses in Figure 7, it seems true that the regressed subject's responses were much more characteristic of a child's world than the responses of the simulator. Take, for example, the response to the word "soft." The simulator responded with the word "banana," the regressed subject with the word "ice cream."

It appears plausible that "ice cream" was much more characteristic of the child's world than the word "banana." Cultural

Stimulus Word	Simulator		Regressed	
	Adult	Age 4	Adult	Age 4
<u>Table</u>	Chair	Chair	Top	Play
<u>Dark</u>	Light	Light	Room	Bed
<u>Myth</u>	Fable	What's a myth?	Fable	I don't know.
<u>Man</u>	Woman	Woman	Woman	Daddy
<u>Deep</u>	Shallow	Deeper	Sea	Well
<u>Penis</u>	Vagina	I don't know.	Man	I don't know that word.
<u>Soft</u>	Hard	Banana	Shoulder	Ice cream
<u>Mountain</u>	Mole hill	Hill	High	I don't know
<u>Red</u>	White	Apple	White	Candy
<u>Hand</u>	Foot	Fingers	Body	Eat
<u>Vagina</u>	Penis	Don't know	Woman	I don't know.
<u>Soldier</u>	Sailor	Suit	Army	Uncle Bill
<u>Bad</u>	Good	Boy	Child	I haven't been bad.
<u>Television</u>	Radio	Picture	Home	I don't know what it is.

Figure 7. Comparison of responses of one simulating
and one regressed subject on the
Word Association Test

difference must, of course, be taken into account. "Banana" may be closer to the phenomenal world of a child raised on a farm. "Ice cream" may be more characteristic of the urban child's world.

In the Pledge of Allegiance test, two regressed subjects used improper wording. One subject at the regressed age of ten said, "One nation invisible...etc." The other subject at the same regressed age said, "One nation indivigable...etc." Both of these involved the same word. It may be that this word is misunderstood more than any of the others when children are learning the pledge. Certainly this word is difficult for children to spell. Both "allegiance" and "Indivisible" were most frequently misspelled.

IV. DISCUSSION

A. Selection of Tasks and Results

The objective of the analysis of the results was to assess the performance levels of the subjects under different experimental conditions. These performance levels were inferred from the behavioral responses of the subjects rather than test scores of achievement. Such an approach presented many problems not found in tests ordinarily scored by the "plus and minus" method.

Scheerer (1946) pointed to the heart of the difficulty when he said,

We need a psychological analysis of the tasks which a test item presents. This demands a 'phenomenological' and experimental identification of those processes which are requisite to the solution. If it is found that the same solution can be achieved by various alternative processes, either the task must be altered so that it permits only one type of solution, or the subject must be prevented from using the alternate procedure. (p. 658)

The selection of tasks was guided by the principle that the task problem should point to the psychological functions and processes which might underlie their solution. Two further principles influenced the choice of task: namely, one, would the test make possible an assessment of performance levels, and two, did the test differentiate between simulation of the experimental age level and the hypnotically induced age regression to the particular level.

These two questions are of course inter-related. If earlier

functional schemata were really available to the simulators in the "conscious" state, then no matter how effective a test was in assessing performance levels it would still not offer any way to differentiate between simulators and regressed subjects. Since it is our point of view that these schemata would not be actually available, then if a task was really successful in teasing out earlier functional schemata, it should also uncover striking contrasts in the performance levels between the regressed and simulating subjects.

It was not sufficient to record a simple failure. How the subject arrived at an erroneous solution was much more important. Hence it was necessary that the tasks selected and the instructions given could elicit the kind of error made. In this way the performance level of the subject who unsuccessfully attempted to solve the problem should become apparent.

For this reason we should not have presented tasks that could be answered by a simple, "I don't know." If our tests had been arranged in such a manner that an "I don't know" answer would not have been possible, then the adult would have been forced to make a guess as to the behavior or error that a child would make. Such guessing is of course more difficult than an "I don't know" answer. Since the functional schemata of a child are not ordinarily available to the adult, the adequate child-like response more often than not transcends the imagination of an adult.

The availability of well established criteria for differences in performance level in the solution of the task was another important problem. An emphasis on "process" or "function" in child

development is only of relatively recent concern to experimentalists. The difficulties in this kind of research have awaited the ingenuity of such investigators as Piaget and Werner. Closely related was the question of whether established criteria were available for the age level at which the various differences in performance level manifest themselves. This is a developmental problem which also has many cultural ramifications. McCarthy (1930) and Deutsche (1937), two American investigators, have found that Piaget's age norms were not the same as those found for American children.

The results of the various tests will be discussed as they bear on these problems of the relationship between the level at performance difficulty and the chronological age level.

The Hollow Tube Test seemed to be a useful test for bringing out differences in the performance level of the subjects. There was a significant correlation between decreased level of performance complexity and "regressed" ages ten and seven. At regressed age four this correlation was not significant.

At age four some simulators may have avoided the content of the task by giving "I don't know" or "I guessed" answers so that they received a lower performance score. This factor may have contributed to the absence of a significant relationship between performance level and the regressed condition, which was only found at age four. This test needs further refinement at the age four level to prevent subjects from answering with "I don't know" instead of making positive attempts at solutions which would be scorable as to the performance level.

Another indication that this was a good test for assessing cognitive levels is the fact that as the age increased, the performance level of the regressed subjects increased. Table I shows that none of the subjects at regressed age four achieved higher than performance level three, none at regressed age seven achieved higher than level four, and none at regressed age ten got higher than performance level five. It must be re-emphasized that these performance levels are not age levels but levels of increasing complexity and maturity of solution of difficult tasks.

This test was even more effective in discriminating between simulating and regressed subjects, in regard to their operating on the suggested age level. Except for two subjects who at regressed age four gave a response more compatible with a higher age level, all of the regressed subjects demonstrated the predicted performance level at each age level. Ten of the simulators, at the different experimental age levels, gave an adult type performance level, whereas none of the regressed subjects did this. Even at experimental age four the principle of odd and even (adult level) was enunciated by one of the simulators as the explanation for his answer.

The performance of the subjects on the Left and Right Test showed a great deal of fluctuation. At age ten, we expected all of the subjects to pass the test. As predicted all of the simulating and regressed subjects did pass. We expected to contrast this with the performance of the subjects at age four. With the exception of one all regressed subjects failed both of the questions

on this test which required that they be able to take the position of the other person in determining left and right. This was essentially in accordance with our prediction. Three of the five simulators performed above the expected level for this age, thus showing a trend in the direction of the predicted differences between simulators and regressed.

This test was one of two tests in the entire experiment on which a regressed subject performed at a level above that of the suggested age. It is highly questionable whether a child of four would know left and right of objects from the point of view of a person facing him. Either the subject was a precocious child, or something in the task itself or in the procedure caused fluctuation. This last possibility is unlikely in view of the fact that none of the other regressed subjects showed such a fluctuation on this test.

The Arithmetic Test provided some rather interesting data from the point of view of levels of functioning. It was predicted that at age ten both simulators and regressed subjects would perform successfully on all questions. The data support this. Since no difference between the two groups was predicted the fact that we did not get a significant correlation of level of performance with either of the two groups was to be expected. It was, however, predicted that some simulating subjects might function at a performance level higher than that of the suggested age by using the principle of cancellation. Three of the five simulators verbalized this principle, one at the younger age of seven. None of the regressed subjects did this. At age seven there was perfect cor-

relation between lower performance level and the regressed age. In contrast all of the simulators functioned here at a level higher than this suggested age. All the regressed subjects performed at levels consistent with the suggested age, seven and ten.

In view of the definitive nature of the results, we concluded that this test was an excellent test for judging levels of cognitive development. The levels of performance are fairly easy to define, and criteria for age levels are readily available. If qualitative analysis of functioning is focused on, rather than the correctness of the answer, the test is easily quantified, and provides a suitable qualitative basis for comparisons of various cognitive levels of development. The test was most effective at the age seven level.

In addition the test was an extremely difficult test to simulate in view of the fact that the focus of attention of the simulator was usually on giving the correct answer, rather than on the manner of functioning. Even if a simulator tried, he would be most unlikely to recall his manner of functioning at that age.

It is necessary to add here that reaction time provided a highly distinguishing characteristic between the simulators and the regressed. There was a significant correlation between increase in reaction time and the regressed condition at both ages ten and seven. In view of the fact that children would be expected to take longer to solve these problems, this result gives additional support to the conclusion that the regressed

subjects were acting at a level appropriate to the suggested age.

As predicted, all of the regressed subjects failed the Clock Test at age four. Only two of the simulators failed at this age. The two simulators and the regressed subjects simply said they could not tell time. Thus the difference between the two groups did not turn out to be statistically significant. Significance of a difference here could have been obtained only if all of the regressed subjects failed and all of the simulators succeeded. It is highly unlikely that the three simulators who gave some level of performance on the Clock Test had been precocious enough at age four to tell time. It was concluded, therefore, that the simulators, as a group, had more difficulty than the regressed subjects in approximating the behavior of the four year old with respect to telling time.

At age seven none of the regressed subjects succeeded in answering all the questions about time, whereas all of the simulators answered all of the questions. There was perfect correlation between lower performance and the regressed condition.

In summary it appears that at age seven, the Clock Test is a fairly good test for assessing the performance level of subjects with respect to the development of spatial, symbolic relations. At age four, further work is necessary to improve this test in preventing "I don't know" answers.

The Word Association Test was used to assess the concreteness or abstractness of the associations of the subject. The direction of a child's thought tends to be rather specific, "concrete." As he grows older, his association to words tends to become more

general, more "abstract." Using only these categories of abstractness and concreteness, we believe that the analysis of the test data indicates a highly effective tool for discriminating between adult-like and child-like performance. There was a statistically significant difference between the responses of the simulators and the regressed subjects. There was likewise a significant difference between the responses of the regressed subjects at the various suggested age levels. The latter was not the case for the simulators. Thus, this test did not only discriminate between simulators and regressed subjects, but also was an effective instrument in discriminating between the various suggested age levels in the regressed conditions.

It is necessary to state, however, that no criteria as yet exist for the proportion of concrete and abstract responses to be expected at any particular age level. All that has been established is that the younger the child, the more concrete his responses. For this reason we made no attempt to assess whether or not the subject's proportion of abstract responses were in accord with the suggested age level. We can only say that with the lowering of the age levels, the proportion of abstract responses decreased significantly for the regressed subjects; and it did not significantly decrease for the simulators.

Woodrow and Lowell (1916) comment on the difficulty they had with very young children because they tended to respond with sentences rather than with one word. They also commented on the large number of failures to respond to the stimulus word in one way or another, which they claimed to be characteristic of children of very young ages. Most of our subjects gave one word responses

at all age levels. (There were, however, some failures to words other than the four specially selected words.) It is necessary to point out, therefore, that in this one respect the behavior of the regressed subjects did not match the characteristic behavior found by Woodrow and Lowell.

In view of the fact that we always instructed all subjects to respond with the first word they thought of, it is possible that the results were determined by the rather literal and automatic obedience found in the hypnotic state. We asked the subjects to respond with the first word that came to their minds and they obediently complied. In the manner of execution, then, their verbalizations were not completely childlike since sentences were rarely used. However, the content and level of the responses did correspond to what Woodrow and Lowell found. Our findings emphasize the need for giving hypnotic instructions in such a manner so as not to interfere in any way with the spontaneous execution of the task.

The Mud and Lollipop Test proved to be an effective instrument for assessing the emotional level of the subjects. As has been previously reported by many experimenters, there seems to be no question about the apparent genuineness of the emotional aspects of the regression. The tasks that we selected to test this were emotionally enjoyable to children, and more or less discomforting if not distasteful to adult simulators.

This contrast was manifested by the difference in behavior between the regressed subjects and that of the simulators as well as by the behavior of the experimental subjects in the regressed

condition and in the adult state.

The genuineness of the emotional behavior of the regressed subjects is evident throughout the record. The sample protocols in the appendix provide examples of this. An objective validation of this behavior would require quantification of several hundred pages of transcripts and was not considered within the scope of this report.

The Questionnaire was an effective instrument in testing memory for specific events. There was no significant difference between the number of memories produced by experimental and control subjects in the normal waking state. There was, however, a significant difference between simulators and regressed in the number of memories produced by the regressed subjects at the age levels of ten and seven. (At age four no test was given.) The more frequent use of such questions where answers may be objectively validated is a technique which is badly needed in hypnotic memory experiments. The answers to the selected questions in our experiment indicate that what was remembered in the hypnotically regressed state consisted of actual specific memories most of which were objectively validated by census records. The few items of specific memory that could not be validated were not, however, proven to be false. They might have been "genuine" memories. Even if they were fabulized, it is surprising to note the minimal amount of fabulizing actually produced by the regressed subjects during the whole experiment.

The reproduction from memory of the page number on which a favorite song appeared in a second grade music book by a twenty-one year old adult seems an impressive demonstration of the revival of

a specific memory trace when the original experiential context is reinstated in hypnosis.

Table XXVII is a summary of the performance of the subjects on the tasks presented to them. At each age level we have listed the number of tests on which each subject performed at a level consistent with, above, or below the experimental age. The data in this Table suggest the following trends:

(1) The regressed subjects tended to function at a level consistent with the experimental age.

(2) The regressed subjects functioned at the experimental age level more consistently than the simulating subjects did.

(3) When the regressed subjects deviated from the experimental age level, they tended to function below the experimental age.

(4) The simulating subjects tended to function above the experimental age level.

(5) The lower the experimental age, the more the simulating subjects tended to function above that level.

These observations are all in the direction suggested by our hypothesis.

Experimenters such as Young (1940) who have used M.A. Intelligence Tests to evaluate hypnotic age regression have concluded that subjects function approximately two to three years above the suggested age level. Our findings suggest, however, that when levels of performance are used as a measure of regression, subjects tend to function at a level consistent with the suggested age; and when deviations from the regressed age level occur, they tend in the direction of a lower performance level.

TABLE XXVII

NUMBER OF TESTS ON WHICH EACH SUBJECT PERFORMED AT A LEVEL
BELOW, ABOVE, OR CONSISTENT WITH THE EXPERIMENTAL AGE

	Simulators				Regressed			
	Subj.	0	/	-	Subj.	0	/	-
Age 10 (4 tests)	III	2	2		A	4		
	VI	4			B	3		1
	IX	4			C	4		
	XIV	2	2		D	4		
	XV	3	1		E	3		1
Age 7 (4 tests)	II	1	3		A	4		
	V	1	3		B	4		
	VIII	1	3		C	3		1
	XII	1	3		D	3		1
	XIII	1	3		E	3		1
Age 4 (3 tests)	I		3		A	3		
	IV	2	1		B	3		
	VII	2	1		C	2	1	
	X		3		D	2	1	
	XI	2	1		E	3		

B. The Problem of Fluctuation

The problem of the fluctuating nature of hypnotic age regression was discussed in Chapter I. There can be no doubt that such fluctuations do exist. Two regressed subjects performed on a higher level at age four, each on different tests. Interestingly enough, one of these was the subject who dramatically recalled the page number of a favorite song in his second grade music book, which he had not seen for fourteen years. This finding tends to support the view that the fluctuating nature of hypnotic age regression need not interfere with the subjective experience of "phenomenal similarity" which may usher in the specific memory.

The fluctuation and unevenness of performance in regressed states has been attributed to the subjects' tendency to oscillate between behaving as he thinks a child at a particular age would behave, and behaving on the basis of an actual revivification of an "earlier psychophysiological state." (Erikson and Kubie, 1941)

The data of this study showed a marked difference between the performance of the simulating adults who were acting as they thought a child would act and that of the regressed subjects. There was a significant correlation between the lower level of performance and the regressed condition in a number of test situations. The regressed subjects acted quite differently from the way the control adults believed, remembered, or imagined how a child would act the respective age levels.

This behavioral contrast may lead to the conclusion that the regressed subjects fluctuated less between adult attitudes and responses on the one hand, and actual childlike functioning on the other, than is usually reported or inferred in the experimental literature on hypnotic age regression. In other words, the

experimental subjects differed from the control subjects by rarely showing behavior which resembled that elicited from an adult who is pretending to be a child. The inference, therefore, strongly suggests itself that fluctuation was minimal. If this inference is correct it also poses the question to what extent the so-called fluctuations are an artifact corresponding to the relative incompleteness of the hypnotic regression.

We have postulated that both forms of behavior existed in the hypnotically regressed state in varying degrees based upon the availability of earlier schemata of functioning. The results appear to confirm this. The data on the hypnotically regressed subjects suggest a fairly extensive revival of earlier modes of functioning. This leads to the assumption that fluctuation in a hypnotically regressed state is minimized to the extent that earlier schemata of functioning is revived. The relative lack of fluctuation and the successful revival of functional schemata in the hypnotically regressed subjects may further be explained in two ways:

- (1) By the careful induction and training procedure which assured maximum regression.

- (2) By selecting tasks in which the focus is rather on the functional schemata, i.e., the mode of procedure, than on plus or minus achievement.

In view of the marked quantitative and qualitative differences between the simulators and the hypnotically regressed subjects, it is difficult to fully accept the role playing hypothesis as applied to hypnotic age regression. The premise for this hypothesis has

to be that most people can recall earlier functional levels at will. The data of this experiment argue against that premise because such willful recall was not possible for the simulators. The regressed subjects were, however, successful in reviving memory traces of levels of performance appropriate to the suggested age levels, i.e., their behavior was similar to children at the suggested ages.

C. Methodological Comments

In addition to the stated need for a more careful selection of tests and a more careful procedure for teasing out performance levels, there are other methodological improvements which might be made in future hypnotic age regression experiments.

1. It might be argued that if the regressed subjects were simulating, then the fact that they were given a test at age ten and then given the same test at age four would help them to simulate age four much better since they had some familiarity with the test. The data showed, however, that having had the test at one age level did not result in a more appropriate performance for the regressed group at each subsequent level. Age four was the last level suggested to the experimental subjects and it was at this level only that some regressed subjects performed above the suggested age. In developing the procedure, it was decided to start with age ten and then go down to earlier levels because it was then possible to give the subject the suggestion to "forget everything that happened after you were ten, seven, or four years old," whichever the case might be. It was felt that this would be

less confusing for the subject and avoid possible contamination of the regressed ages. The alternative procedure to begin with the earlier levels and proceed upward would have required a hypnotic suggestion--added to the already necessary age regression suggestion--that the subject also forget the previous hypnotically induced age level when he moved up from age four to age seven and from seven to ten.

(These considerations may not detract from the informative value of reversing the order of regression for half the subjects. That is, have one half the subjects begin with age ten and go downward and have the other half of the subjects regressed to age four first and go upward.) The entire problem could be eliminated by having different subjects for each regressed age level.

2. It has been suggested that the improvement of memory in hypnosis may be due to the suggestion to remember. In our experiment we were careful to eliminate the suggestion to remember from all of the control and experimental conditions. The argument may be raised, however, that in some manner a suggestion to remember was indirectly implied by the mere fact of the hypnotist asking the subject to give specific information at a given age level. Perhaps a more rigid test of this would be to actually give a suggestion to remember these same facts in the hypnotic adult state (without regression). The answers would then be compared with the answers about the same events in hypnotic age regression.

3. The question has also been raised that the hypnotic state per se results in improvement of memory. Our data showed that there was an improvement in the specific recall of events in the

somnambulist state. However, the improvement was not statistically significant. It was concluded that the hypnotic state may improve memory for specific events. Yet the revival in hypnotic age regression of functional schemata consistent with the age at which the events were experienced resulted in a significant increase in memory for specific events above the previous test in the adult hypnotized state.

D. Theoretical Considerations

How can what seems like the revival of functional schemata be explained under hypnotic age regression? And could such explanation throw some light upon the nature of the hypnotic regressed state itself?

We would like to briefly sketch a theoretical model which would bridge the notion of developmentally determined functional schemata, their preservation as trace systems on the one hand, and the psychoanalytic notion of the pre-conscious.

Rappaport (1951) has likened the earlier developmental stages of thought described by Piaget and Werner to the "primary mental process." He compares the syncretic and autistic thinking of the child to the kindred phenomena assumed to be characteristic of the primary mental process. Freud (1938) and Rappaport (1951) both hold that the path to consciousness of the primary processes lies through the pre-conscious. In the pre-conscious the secondary thought processes may take over by bringing goal-directed thought to bear upon them; and thus subordinating them to consciousness and to the ego. In repression the primary thought processes may be redirected back to the unconscious. In the same way earlier

developmental schemata which have been likened to the primary thought processes may enter the pre-conscious. Such a theoretical model implies a hierarchical level of thought in which the earlier developmental levels and primary processes are characteristic of lower order levels of consciousness which have been called the pre-conscious and the unconscious. The secondary thought processes (directed and conceptual thinking) are characteristic of consciousness, the highest level in the hierarchy. To reach these earlier developmental levels then, closer contact would have to be made with the pre-conscious.

There are many resemblances between the hypnotic state and the pre-conscious. For example, automatic behavior in hypnotism such as automatic writing resembles automatisms which are characteristic of the pre-conscious level of thought. It is proposed that the hypnotized state is akin to pre-consciousness in varying degrees. The light state of hypnosis is a state closer to consciousness than to pre-consciousness. The subject is, so to speak, "at the door" of the pre-conscious. In the somnambulistic state of hypnosis, the individual is now functioning almost pre-consciously. The nature and contents of pre-conscious thinking are now easier available to him than otherwise. Earlier functional schemata may become revived because they are closer to primary thought processes. It would not be far fetched, then, to speculate that in hypnotic age regression particularly the person is functioning on a pre-conscious level. Such an hypothesis seems to be compatible with the data of this study and also the premise of the study, that a change in Ego state which makes possible some contact with an earlier Ego stratum may make available traces embedded within that earlier Ego stratum.

V. SUMMARY AND CONCLUSIONS

A group of five hypnotic subjects capable of deep trance were regressed to ages ten, seven, and four, respectively. They were given a number of different tasks to perform, designed to elicit levels of performance consistent with the suggested age.

Another group of fifteen control subjects were asked to simulate to the best of their ability the ages ten, seven, and four respectively. They were given the same tasks as the hypnotically regressed subjects.

Both the experimentally regressed subjects and the simulating control subjects were also tested for the recall of certain specific events which took place at the time the subjects actually were ten and seven years old.

It was hypothesized that if the hypnotically regressed subjects were able to revive memory traces of functional schemata characteristic of earlier levels of development, they would in the regressed state also be able to revive some memory traces of specific events that occurred at that age level.

A performance analysis of the responses of the subjects on the tasks given at each suggested age level indicated that the hypnotically regressed subjects' functioning tended to approximate

that of the child at the respective age levels. The simulating control subjects tended to function above the suggested age level. When the hypnotically regressed subject deviated from the suggested age level, they tended to perform at a level below the suggested age level. There was a significant improvement in the recall of certain specific events between the waking and the hypnotically regressed states. There was no significant improvement of the recall of specific events in the simulating control subjects.

The data seems to support the conclusion that hypnotic age regression appears to be a phenomenon in which the revival of earlier modes of experiencing (functional schemata) can become possible. And, that when this occurs the recall of specific events embedded within the context of these earlier modes of experiencing becomes significantly improved.

It is necessary to admit that the postulation of the revival of past trace systems (functional schemata) and of specific event traces embedded in these, may appear to many as extremely radical and arouse skepticism. This postulation implies a premise of constancy of traces and trace systems contrary to the usual theories of memory. We can only point to our data as they are. The final decision on such a premise must await further research.

The value of this study, which is only a pilot study, lies chiefly in the fact that it yielded sufficient experimental suggestive evidence to justify the re-examination of current conceptions of memory traces.

Up to the present, dynamic psychology has assumed the fading or decay of memory traces and trace systems. We would like to add a hitherto unconsidered dynamic possibility; namely, that in time a memory trace may become extremely weak and even modified, but that if the larger trace system and Ego stratum (functional schemata) in some way become reactivated, a specific trace may again be re-organized. It then takes its place in its now reactivated former system. Such a hypothesis could mean the following possible fate of a trace: 1. impression, 2. trace, 3. decay or transformation (e.g., levelling, sharpening, schematization, fading, etc.), 4. reconstitution of the original trace when a phenomenal similar environment and Ego stratum are also reconstituted.

The hypnotic state is not the only condition in which the reconstitution of a trace may take place. It may occur when the person is under stress, and it undoubtedly happens in dreams. But the hypnotic state is perhaps the best of these as an experimental tool with which to study the fate of a trace. Perhaps through the further use of this tool it may be possible to shed more light on the possibility of a dynamic reconstitution of a previously faded or decayed memory trace.

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APPENDIX

Sample Protocols

Sample Protocol #1 (Excerpts from the verbatim record of subject #3)
(Simulating age 10.)

The subject entered the playroom with a hustle and bustle. He immediately picked up a box of blocks and smiled. He seated himself in a small low chair at the small table and then seemed to forget his role. He pulled up his trouser legs as if he were a big business man about to tackle a big job and proceeded to build a small castle with the blocks which he had carried to the table with him. After a few seconds he appeared to become disgusted with the blocks, got up from the table and strode over to the shelves where there were many toys and picked up a tractor which he examined briefly. He seemed disinterested in this and returned it to the shelf. He then viewed with apparent distaste some playing cards which were lying on the second shelf. From this he went to the closet and examined the contents of the shelves. Apparently nothing interested him as he turned sharply on his heel and returned to the table where he seated himself. He promptly tore down the castle he had previously built. He appeared to make the decision that he wanted to build a larger castle and began to lay blocks to build a larger one. After only a moment of this, he abandoned this project and picked up a magic slate and began to trace over it with his left forefinger. He knitted his brows as if trying to determine in his own mind whether this was the right way to do this. He appeared to tire of this after a few seconds and laid it down and went to the shelf again where kneeling on one knee, he pulled out the box of blocks from the lower shelf. He merely glanced through these uninterestedly and left them sitting on the floor while he returned to the closet and picked up a toy machine gun. He assumed a standing shooting position with the gun then laid it down on the top shelf. He quickly walked over to the sandbox, glanced at it, then walked over by the punching bag and gave it a few cursory punches in passing and returned to the table. He took the blocks he had used in the construction of the castle and put part of them on the floor. He then took the tinker toys and started to construct something with four wheels. There was a nervous energy in all of his activities as though he had some great inner drive which was pushing him quickly from one thing to another, and which he could not satisfy. He did not appear to know exactly what he wanted to do. His tinkertoy construction fell apart and with a disgusted look on his face he picked up the tinker toy box, turned it around and around apparently in an effort to ascertain whether or not it contained instructions. While holding it in one hand he looked through some blank pieces of paper which were lying on the table in an effort to see if any of them contained instructions. He did not find any and made a move as if to return the tinkertoys to the box. He did not put them back and said, "It's my custom to leave things out instead of putting them away." E. answered, "Well, try not to step out of your role." S. smiled, left the

Sample Protocol #1 Continued

tinkertoys and walked over to the shelf and back. He picked up a game, rejected it and laid it back down. Again, with a display of nervous energy he returned to the table and replaced the tinkertoys in the box, he then replaced the blocks in the box. E. asked him to sit at the small table and began to give him the tests.

On the hollow tube test, S. watched with a sort of cynical interest and picked and pulled at his centennial beard while making his answers. On this test, he appeared to answer as a sophisticated college student. When he first started answering, his attitude seemed somewhat as though he considered the entire play exceedingly childish, but he would play along. However, as the questions became a little more complicated he exhibited a little more interest.

E. presents simple order. "Which one will come out first?"

S. "The green ball." "The yellow one." "And the red one."

E. presents reverse order and questions S.

S. "The red one, the yellow one, and then the green one."

E. presents 180° turn and questions S.

S. "The red one, the yellow one, and the green one."

E. presents 360° turn and questions S.

S. "The yellow one, the green one, and the red one."

E. presents 15 turns and questions S.

S. "It would be a pure guess on my part. I'd say the red one, the yellow one, and the green one."

E. "How did you know?"

S. "I didn't. It was just a guess."

E. presents 20 turns and questions S.

S. "The other way around, green, yellow, and red."

E. "How did you know?"

S. "I assume that after going five times around it would be just the opposite. It was an odd number of times. Even number would be the same one and an odd number would be the other way, the other one. Just a guess on my part."

On the Left and Right test, S. fingered his beard, but smiled pleasantly. He folded his arms on his knees and watched the experimenter intently. His answers appeared to be spontaneously given.

E. "Show me your right hand."

S. shows E. his right hand.

E. "Show me your left hand."

S. shows E. his left hand.

E. "Show me my right hand."

S. points correctly without hesitation.

E. "Show me my left hand."

S. points correctly.

Sample Protocol #1 Continued

- E. places a penny on S.'s left and a pencil on his right. "Is the penny to the left or right?"
S. "To the left. I'm assuming your speaking of my left and right."
E. "Is the pencil to the left or right?"
S. "To the right."
E. hold a key in his left hand and a penny in his right hand. "Is the penny in my right or left hand?"
S. "Right."
E. "Is the key in my right or left hand?"
S. "Left."

During the Word Association Test S. seemed to be thinking very hard. He appeared to block on the words, penis; vagina; and television. His responses were as follows: Table - chair; Dark - white; Myth - fairy tale; Man - papa; Deep - water; Penis - I dont know; Soft - hard; Mountain - hill; Red - green; Hand - fingers; Vagina - I dont know; Soldier - toys; Bad - spanking; Television - I dont know.

During the Arithmetic Test S. appeared to be sleepy and blinked his eyes several times while giving spontaneous answers.

- E. "How much is 2 plus 2 minus 2?"
S. "Two"
E. "How did you get that?"
S. "Added 2 and 2 together, took 2 away from it."
E. "How much is 4 plus 2 minus 2?"
S. "Four."
E. "How did you get that?"
S. "Cancelled out the two 2's."
E. "How much is two times 2 divided by 2?"
S. "Two."
E. "How did you get that?"
S. "Long drawn out process of multiplying it and then dividing it."
E. "Three little girls are given 9 apples, how many will each have?"
S. "Three girls, nine apples, divided equally would be three."
E. "It takes 20 minutes to walk downtown, I can go twice as fast on a bicycle; How long will it take me to go downtown?"
S. "Ten minutes."
E. "How did you get that?"
S. "Twice as fast would take half as long."

Sample Protocol #2 (Excerpts from the verbatim record of subject D)
(Regressed to age 10)

S. was regressed to age 10. He slowly opened his eyes.
E. "Hi".
S. "Hi."
E. "What's your name?"
S. "A..... B....."
E. "How old are you?"
S. "Ten."
E. "What school do you go to?"
S. "Central Park Grade School."
E. "What's the name of your teacher?"
S. "Miss S....."
E. "Who sits in front of you in school?"
S. "D..... E....."
E. "Who sits behind you?"
S. "No one, R..... C..... did."
E. "What are you studying in school now?"
S. "Writing and art and geography, arithmetic, spelling and singing.
We're going to have a Cantata, The Walrus and the Carpenter."
E. "Are you going to be in it?"
S. "Just in the chorus."

.....
S. entered the playroom. He looked around and noticed the crayons.
He asked E. for some paper and then sat down at the small table
and very purposefully began to sketch.

S. "You want me to make a tree? I will make you a tree, and a plane
too." S. began to draw a tree using brown crayon for the trunk of
the tree and the green crayola for the grass. He shaded his tree
by using black crayon, stopping long enough to take the paper off
the crayon so that he would have a longer piece to work with.
He worked with apparent enjoyment. When he finished his drawing
he very carefully put his signature on it. When he handed the
drawing to E. he said, "I could draw you a good one if I took a
long time."

On the hollow tube test his answers were spontaneously given. He
anticipated the questions eagerly and seemed to regard the test
as an interesting game.

E. presents simple order and questions S.

S. "The green, and then -- I forgot, the yellow one? And the red one."

E. presents simple reversal and questions S.

S. "Red, yellow, and then the green."

E. presents 180° turn and questions S.

S. "Red, yellow, and green."

E. presents 360° turn and questions S.

S. "The green one, the yellow one, and then the red one."

E. presents 15 turns and questions S.

S. "Well I think its red, then yellow, then green."

E. "How did you know?"

S. "Because the first time you turned I said red and then the next time

Sample Protocol #2 Continued

green, and every time you turned it I said the different color."

E. presents 20 turns and questions S.

S. "Red, yellow, and green."

E. "How did you know?"

S. "Same way, I just thought up to twenty. I counted on my fingers.
I want, 16 green, 17 red, 18 green, all the way up to twenty."

When E first presented the Arithmetic test to S. he said, "Oh, I can't get these." He seemed to be uncomfortable with arithmetic problems and often interjected that he didn't like arithmetic.

E. "How much is 2 plus 2 minus 2?"

S. "Two."

E. "How did you get that?"

S. "I added 2 and 2 and got 4 and take away 2 is 2."

E. "How much is 4 plus 2 minus 2?"

S. "Four."

E. "How did you get that?"

S. "4 plus 2 are six and take away 2 is 4."

E. "How much is 2 times 2 divided by 2?"

S. "Two."

E. "How did you get that?"

S. "I took 2 times 2 is 4, and I took how many times does 2 go into 4, would be twice."

E. "Three little girls are given 9 apples, how many will each have?"

S. "That's a hard one. (Pause) Three?"

E. "How did you get that?"

S. "Well, I just figured up that if each of em had three and there was three of em, that would make nine, because three 3's are 9."

E. "It takes twenty minutes to walk downtown, I can go twice as fast on a bicycle; how long will it take me to go downtown?"

S. "Twice as fast...mmmm..get there twice as soon, get there in 10 minutes. I just reasoned it. Twice as fast, when the bicycle would get there the other would be half way, so that would be half of twenty."

Sample Protocol #3 (Excerpts from the verbatim record of Subject #13)
(Simulating age 7)

S. entered the playroom and kneeled down in front of the toy shelves taking out a few toys and examining them. He took out the machine gun first and tried to put a clay pellet in it, that didn't work so he laid that aside. He picked up a toy pistol, looked at it, then immediately laid it down. He took up a toy tractor which was on the top shelf and pushed it back and forth for awhile after placing the toy machine gun on top of it. This he abandoned after only a few seconds and started building a fort on the floor with the blocks which were in a box near him. He took the toy machine gun off the tractor and put it in an opening which he had left between the blocks. He began to place toys in different positions. He moved the toy telephone and took some of the other toys on the shelf and changed their positions. He got up from the floor, walked over to the closet and brought out a box of toys. While he was doing this he was holding the toy pistol in his left hand. He began to take toy soldiers out of the box and place them in position in his fort of blocks. He sat flat on the floor with his knees under him while he was stationing his army. He took the telephone up and put the receiver to his ear and began to shout orders saying, "Hello in the fort!" "There's a charge from the right. Fire all cannons!" He left this and then stood up and took a few punches at the punching bag. He abandoned this immediately and went back to the closet and took the machine gun and pointed it at the door and said, "ach-ach-ach" as he fired it. He returned to the shelves, kneeled down in front of them and shot his pistol several times. He picked up the tractor and tried to roll it on the floor, but one of the rubber rollers refused to roll, so he threw the tractor back on the shelf. He picked up some crayons and started writing on the side of a box while sitting in a kneeling position. He picked up a finger paint jar, looked at it but placed it immediately back on the shelf. As he picked up the football E. asked S. to sit down at the small table to answer some questions and play some games.

[On the word association test S. responses were given quickly and it appeared as though he had forgotten that he was supposed to be seven years old. His responses were as follows: Table - chair; Dark - light; Myth - greek; Man - woman; Deep - water; Penis - man; Soft - hard; Mountain - river; Red - blue; Hand - finger; Vagina - woman; Soldier - battle; Bad - good; Television - screen.]

Sample Protocol #4 (Excerpts from the verbatim record of Subject B)
(Regressed to age 7)

S. entered the playroom and gave an exclamation of surprise and delight at the sight of all the toys. She walked to the doll house and sat on the floor in front of it. She bent forward a little and tried to lift the roof off.

S. "Doesn't the lid come off? Mine does."

E. "You have one?"

S. "Uh-huh."

E. "What color is yours?"

S. "Brown."

E. "Is it open on the side like that?"

S. "Uh-huh, but this comes off, (indicating the roof)".

E. "Do you have furniture for it?"

S. "Uh-huh, I don't have a fireplace. (She was sitting flat on the floor in Indian fashion. She tried to find a place for the bathroom stool.) There isn't any room for this."

E. "What shall we do with it?"

S. "Why don't we make one?"

S. made a bathroom with stool, tub, and sink. Then she got up and went to the toy shelves. She picked up a doll and said, "I have one of these about this long."

E. "Does your dolly have a name?"

S. "Uh-huh, Jean."

E. "That's a pretty name. What made you decide to call her Jean?"

S. "I have an aunt Jean."

E. then asked S. to sit at the small table.

As the Clock test was given S. seemed very unsure of herself. She pulled at her hair nervously whenever she seemed to be having a little difficulty answering the questions.

E. sets clock at 3 o'clock. "What time is it?"

S. "3 o'clock"

E. sets clock at 6 o'clock. "What time is it now?"

S. "6 o'clock."

E. sets clock at 9 o'clock. "What time is it now?"

S. "Is that sposed to be the little hand? 9 o'clock."

E. sets clock at 1:15. "What time is it now?"

S. "15 minutes after..(pause).. is that sposed to be down there? One."

E. sets clock at half past one. "What time is it now?"

S. "30 minutes after one oclock."

E. sets clock at 1:45. "What time is it now?"

S. "9 minutes till 2 o'clock."

E. sets clock at 10 after 2. "What time is it now?"

S. "2 o'clock ...no....yes."

E. sets clock at 20 to 3. "What time is it now?"

S. "8 minutes till 3 o'clock."

Sample Protocol #4 Continued.

S. responded to the Word Association test as follows: Table - dishes; Dark - dog; Myth - I dont know; Man - woman; Deep - sleep; Penis - flower; Soft - feather; Mountain - Colorado; Red - flower; Hand - arm; Vagina - I dont know; Soldier - boy; Bad - good; Television - I dont know that word. When E. asked her what she was thinking of when she said dogek for dark S. said, "Theres a black dog next door." And when E. asked about flowers for penis S. said, Those flowers. Those big pink ones. I cant say it. It begins with a p."

Sample protocol #5 (Excerpts from the verbatim record of Subject #7)
(Simulating age 4)

On the Hollow Tube test the attitude of S. seemed to be that she was trying to make up random answers. She appeared to be choosing one or the other colored bead whimsically. When E. asked her, "How did you know?" on the last two questions on this test, S. answered, "I guessed."

On the Word Association test her answers were as follows: Table - chair; Dark - bed time; Myth - what?; Man - Daddy; Deep - water; Penis - I dont know; Soft - teddy bear; Mountain - big hill; Red - crayon; Hand - finger; Vagina - I dont know; Soldier - tin soldier; Bad - good; Television - howdy doody.

S. entered the playroom and immediately walked over to the doll house. She squatted and played with the furniture and little toys in the doll house. She used one hand to touch the toys. She moved the dining table around as if she was fixing the table and chairs for a meal, and tentatively set dishes in several places. She got up and fixed her blouse as she walked over to the other side of the room. She appeared to be looking for something to interest her. She spied a large box of blocks. She pulled these out of the closet and sat on the floor building a complicated three tiered structure until the end of the free play period.

Sample protocol #6 (Excerpts from the verbatim record of Subject A)
(Regressed to age 4)

S. was regressed to age 4. She opened her eyes slowly.
E. "Hi Betty"
S. "Hi."
E. "Whats your full name?"
S. "Betty B....."
E. "How old are you?"
S. "This many." (Holding up four fingers for E. to see.)
E. "Can you count?"
S. "One...two....three....four....that's all."
E. "Well you may play with anything you like here."

During the Hollow Tube test S. smiled and watched the beads with interest. When her answers proved to be incorrect she dropped her bottom lip as though she had done something wrong and expected to be punished for it.

E. presented the beads in simple order and questioned S.
S. "The yellow one, the red one, and the red one."
E. presented simple reversal and questioned S.
S. "The green one, the red one, and the yellow one."
E. presented 180° turn and questioned S.
S. "I dont know, the red one? I dont remember the color."
E. presented 360° turn and questioned S.
S. "The red one, the green one, and the yellow one."
E. presented 15 turns and questioned S.
S. "I dont know. The yellow one, the red one, and the red one."
E. "Will the red one come out twice?"
S. "Uh-huh."
E. presented 20 turns and questioned S.
S. "I dont know."